*Table 3-18. Acreage in Xeric and Dry Forest Communities on the Sumter National Forest, 2002.*

| | Andrew Pickens District | Piedmont District |
|---|---|---|
| **Dry-xeric oak and pine*** | 1,700 | 53,685 |
| **Dry-mesic oak-pine and pine-oak** | 9,960 | 2,240 |

*Includes loblolly pine with low site index

Management indicators used to assess management effects to this community are: 1) total acres of woodland, savanna, and grassland complexes restored and maintained in desired conditions; 2) annual acreage of forests thinned for the purpose of restoring desired tree densities; 3) annual acreage of prescribed burning for the purpose of restoring or maintaining open conditions and diverse understories; and 4) populations of management indictor species chosen to represent desired conditions within this type. Management indicator species chosen for this type are field sparrow and northern bobwhite quail.

Population trends for northern bobwhite quail and field sparrow are tracked by annual breeding bird surveys (BBS) and bird point counts conducted on the Sumter National Forest.

## Direct and Indirect Effects

Because of their current rarity, existing remnants of woodland communities that support significant populations or assemblages of rare species would be managed under the Rare community prescription under all alternatives. Similarly, existing woodland conditions associated with glades and barrens also would be included under rare community provisions. The Rare community prescription provides priority to protection and maintenance of such sites under all alternatives, including regular prescribed burning to maintain desired species composition and vegetation structure. Therefore, these sites are expected to be sustained for the foreseeable future under all alternatives.

In an effort to restore some of the ecological role that these communities have historically played, Alternatives A, B, D, E, and I develop areas of woodland savanna habitats. The draft revised plan (Alternative I) includes objectives for restoring complexes of woodlands, savannas, and grasslands to fire-maintained landscapes on 8,080 acres in the short-term and 49,460 acres in the long-term. Focus of management is on developing understory plant communities rather than the overstory. Desired conditions include heterogeneous canopy coverage averaging 25 to 60%, and dense grass and herbaceous ground layers. Scattered patches may be devoid of canopy to provide for interspersed savanna and grassland conditions. Restoration activities may include thinning of trees (generally to less than 60 $ft.^2$ of basal area per acre), prescribed burning, and/or herbicide use. Prescribed fire on relatively short rotations (1 to 3 years) typically would be used to maintain desired conditions, and may involve both dormant and growing season burns.

Acres of woodland, savanna, and grassland complex restored and maintained are predicted for the Sumter National Forest, based on the allocation of management prescriptions and desired conditions across alternatives. This analysis suggests that woodland development will occur across all alternatives to some degree, with the lowest amounts in Alternatives F and G (Tables 3-19 and 3-20).

***Table 3-19. Expected acres for achieving woodland, savanna, and grassland complexes on the Andrew Pickens District of the Sumter National Forest***

| Activity | Alt A | Alt B | Alt D | Alt E | Alt F | Alt G | Alt I |
|---|---|---|---|---|---|---|---|
| Total acres 10 years | **1,800** | **3,400** | **1,700** | **5,700** | **700** | **900** | **2,200** |
| Total acres in 50 years | **5,100** | **6,000** | **2,500** | **13,700** | **1,400** | **3,400** | **7,600** |

***Table 3-20. Expected acres and activities for achieving woodland, savanna, and grasslands complexes on the Piedmont Districts of the Sumter National Forest***

| Activity | Alt A | Alt B | Alt D | Alt E | Alt F | Alt G | Alt I |
|---|---|---|---|---|---|---|---|
| Total acres in 10 years | **5,400** | **10,300** | **5,100** | **17,000** | **2,100** | **2,800** | **5,200** |
| Total acres in 50 years | **20,400** | **24,200** | **10,000** | **54,800** | **5,600** | **13,600** | **17,400** |

Because good examples of this community have become rare or missing on today's landscape, abundance of this community type in the future will be directly related to the amount of restoration and maintenance activities accomplished. Restoration and maintenance activities will provide habitat for species included within this habitat association, including the bobwhite quail, Bachman's sparrow, little bluestem, and smooth coneflower. Populations of these species, with the exception of smooth coneflower, are expected to vary across alternatives based on the amount of woodland savanna habitat restored and maintained.

Restoration and maintenance activities may cause some short-term negative effects to individual MIS, with the exception of smooth coneflower, by causing disturbance, mortality, or temporary set back of plant and animal reproduction or growth. However, species associated with this community are relatively adapted to such disturbances, which are necessary to create and maintain optimal habitat conditions. In balance, these actions would result in beneficial effects to associated species.

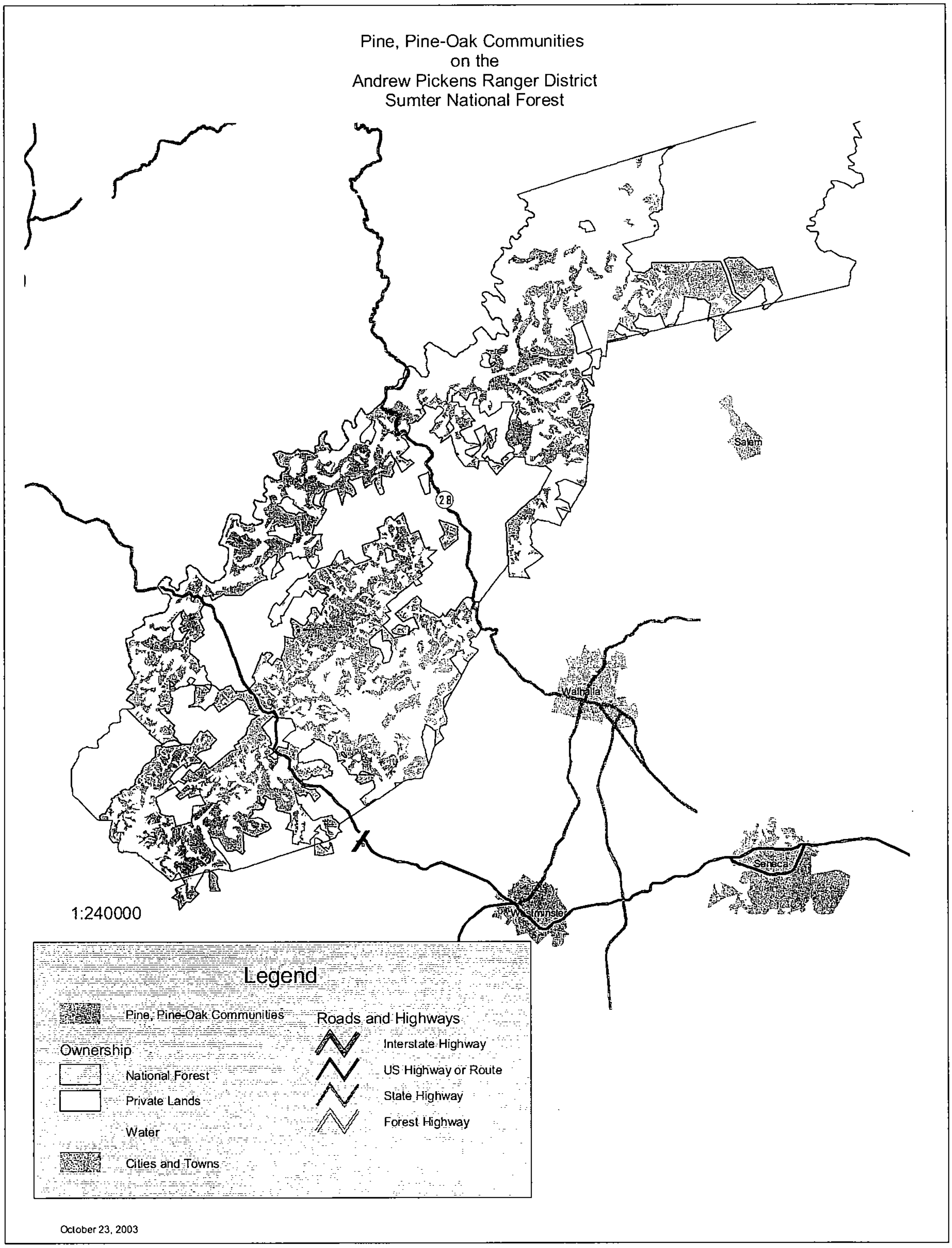
## Cumulative Effects

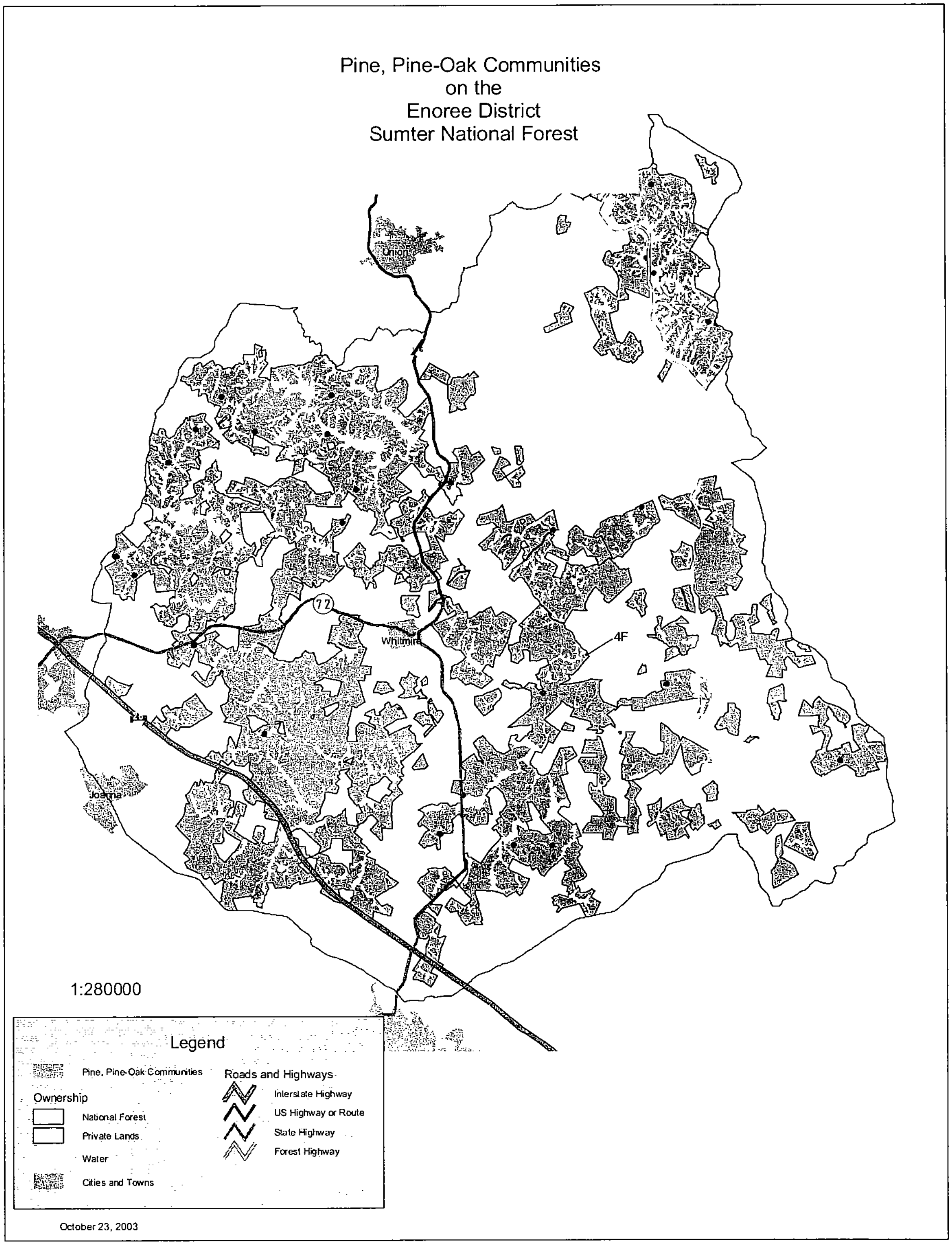
Restoration and management activities on national forests would play a critical role in the conservation of this community within the landscapes containing national forest land. Natural woodland, savanna, and grassland habitats are currently rare, occurring on private ownerships primarily along mowed roadside and power line rights-of-ways (Davis et.al. 2002). It is not expected that private landowners will restore or manage to maintain significant amounts of woodland, savanna, and grassland complexes; therefore, they would remain limited in abundance without national forest restoration efforts.

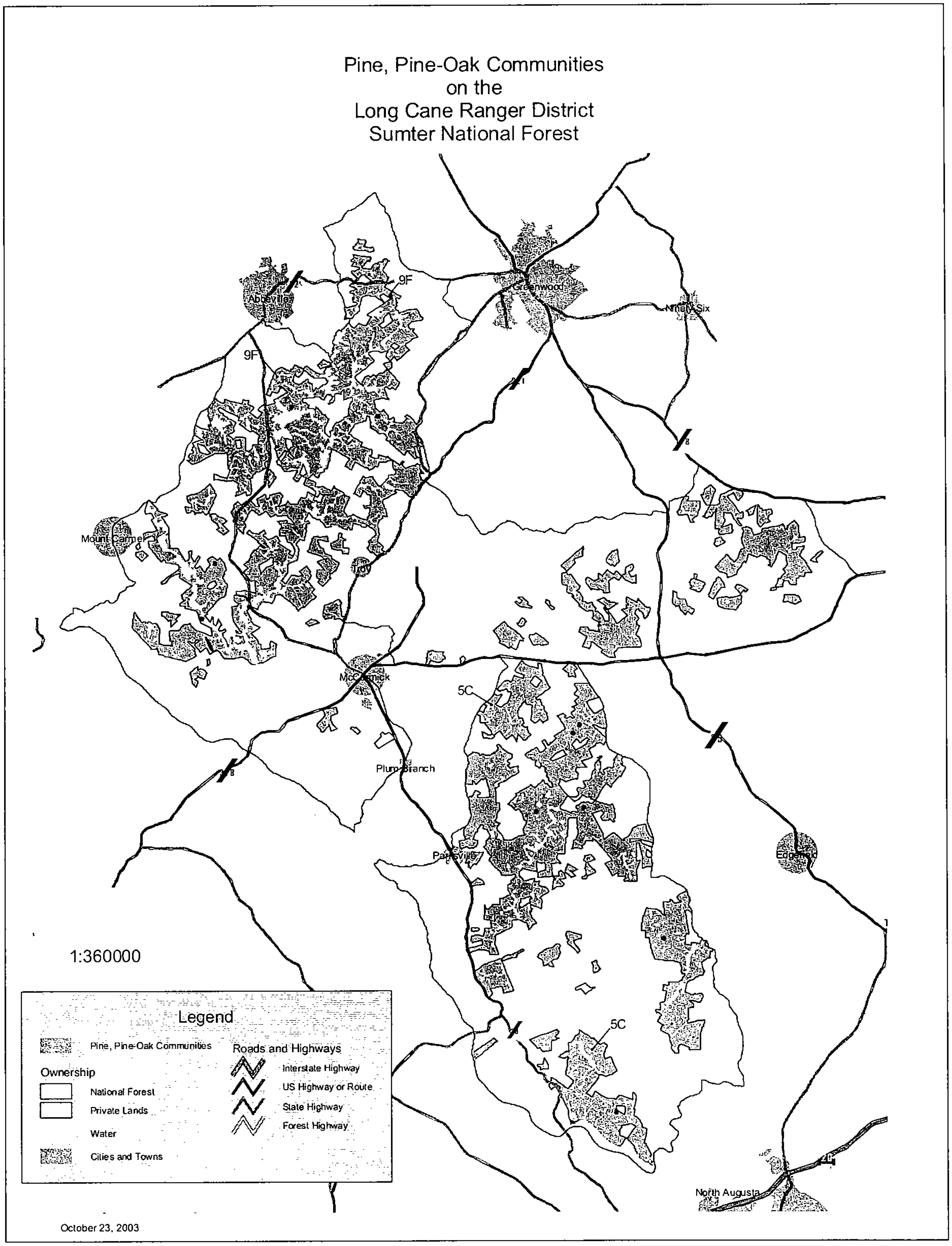
## Pine and Pine-Oak Forests

## Affected Environment

Pine dominated forests covered in this section include all "southern yellow pine" (SAMAB 1996: 163) forest types with various mixtures of hardwood species occurring as minor components. These forests occur on a variety of landforms at a wide range of elevations. Historically, in the Blue Ridge physiographic province, these communities occupied areas that were subject to natural fire regimes and typically occurred on ridges and slopes with southern exposures (NatureServe 2002). However, due to a combination of previous land use, fire exclusion, and intensive forestry (plantations), many pine species have expanded beyond their natural range and today, pine-dominated communities can be found on virtually all landforms and aspects. In the Piedmont, pine and pine-oak forests are common in all topographic locations and often persist as fire-adapted communities on drier sites.


Pine, Pine-Oak Communities
on the
Andrew Pickens Ranger District
Sumter National Forest
28
Salem
Walhalla
Seneca
Westminster
1:240000
Legend
Pine, Pine-Oak Communities
Ownership
National Forest
Private Lands
Water
Cities and Towns
Roads and Highways
Interstate Highway
US Highway or Route
State Highway
Forest Highway
October 23, 2003


Pine, Pine-Oak Communities
on the
Enoree District
Sumter National Forest
Union
72
Whitmire
4F
Joanna
1:280000
Legend
Pine, Pine-Oak Communities
Ownership
National Forest
Private Lands
Water
Cities and Towns
Roads and Highways
Interstate Highway
US Highway or Route
State Highway
Forest Highway
October 23, 2003


Pine, Pine-Oak Communities
on the
Long Cane Ranger District
Sumter National Forest
Abbeville
Greenwood
Ninety Six
9F
9F
Mount Carmel
Troy
McCormick
5C
Plum Branch
Parksville
Edgefield
5C
North Augusta
1:360000
Legend
Pine, Pine-Oak Communities
Ownership
National Forest
Private Lands
Water
Cities and Towns
Roads and Highways
Interstate Highway
US Highway or Route
State Highway
Forest Highway
October 23, 2003

### *Abundance*

During the last 50 years across the southeastern United States, pine plantations have increased in importance, expanding from 1% of the total pine forest acres to 48% of those acres (USDA Forest Service 2001: 1). At the same time, the 20-year trend reported for the Southern Appalachian Assessment area (SAMAB 1996: 27) shows a downward trend of 16% for southern yellow pine forests. These two facts together suggest that natural yellow pine forests have declined significantly and represent an opportunity for large-scale restoration of this community type.

The Sumter National Forest has been experiencing a southern pine beetle epidemic since 2001 and currently about 36% of southern yellow pine stands on the forest have been impacted. Historical data suggests that large areas that have become occupied by even aged stands of loblolly pine would have naturally supported mixed pine-hardwood stands of loblolly (on more mesic sites), longleaf (pitch pine in the mountains) on drier sites, and shortleaf pine. These natural communities are maintained by low intensity fires originating on ridgetops and southern exposures (NatureServe 2002). With substantial mortality in existing pine stands due to pine beetle effects, there are some opportunities to restore these sites to a more natural mixed pine-hardwood community.

### *Age Class Distribution and Forest Structure*

On the Sumter National Forest, pine and pine-oak forests are currently well distributed across the landscape (Table 3-21).

*Table 3-21. Current acreage (m acres) of pine and pine-oak forests on the Sumter National Forest by physiographic area and successional class.*

| | Sumter National Forest | |
|---|---|---|
| | Mountains | Piedmont |
| Early Successional | 1.5 | 14.6 |
| Sapling/Pole | 5.5 | 40.8 |
| Mid- Successional | 10.3 | 73 |
| Late-Successional (including Old Growth) | 19.8 | 84.9 |
| Total | 37.1 | 213.3 |
| Total acres of M-L Succ. pine | 30.1 | 157.9 |
| % of total pine, pine-oak acres in mid- and late-successional pine forests | 81 | 74 |
| % of total forested acres in mid- and late-successional pine, pine-oak forests | 36 | 57 |

The Southern Appalachian Assessment (SAMAB 1996: 165, 168-169) summarizes the age class distribution of pine and pine-oak forests across the Southern Appalachian assessment area by a variety of land ownerships (Table 3-22).

*Table 3-22. Successional stage distributions (in %) for pine and pine-oak forests across several ownerships in the Southern Appalachian Assessment Area.*

| Successional Stage | Sumter NF (mountains only) | All Public Lands | All Private Lands | All Ownerships |
|---|---|---|---|---|
| Early Successional | 3.1% | 10% | 18% | 16% |
| Sapling/Pole | 11.7% | 9% | 19% | 18% |
| Mid- Successional | 28.2% | 32% | 59% | 55% |
| Late-Successional (includes old growth) | 57% | 49% | 4% | 11% |

National Forest data is derived from the CISC Database. Data for other ownerships is derived from FIA and LANDSAT data

Several species of viability concern are associated with late-successional southern yellow pine forests maintained in open conditions by frequent fire (Appendix F). While public lands support the majority of late-successional acres, the structure and composition of these forests has been altered due to years of fire suppression resulting in less than optimal habitat conditions. Fire intolerant species such as loblolly, Virginia, and white pine have proliferated while other pines (shortleaf, pitch, Table Mountain, longleaf) have seen dramatic declines (NatureServe 2002; Martin et.al. 1993). In the absence of fire, hardwoods, shrubs, and vines have replaced the open, grassy, herbaceous layer that is characteristic of frequently burned areas, and hardwoods have encroached into the midstory further affecting forest structure. This change in forest structure and resulting habitat condition has had a direct effect on species dependent upon these communities. Several bird and reptile species associated with southern pine forests are in decline (Dickson 2001) as various habitat components are lost. In addition to declines in species dependent upon specific habitat attributes, entire pine communities are in decline. Recent studies show that acreage of Table Mountain pine communities (considered a rare community in the Southern Appalachians) has decreased due to fire suppression (Turrill and Buckner 1995) and that many remaining examples have substantial hardwood invasion.

### *Management Indicators*

Several management indicators have been identified for assessing effects to pine and pine-oak forest communities. These indicators include both key habitat variables and management indicator species (MIS).

Key habitat variables to be monitored annually include the number of acres of pine forests burned, the number of acres of pine plantations restored to natural communities, and the total number of acres of pine forests restored. These activities together indicate the level of effort directed at maintaining or restoring pine and pine-oak communities.

The pine warbler (*Dendroica pinus*) and brown headed nuthatch *(Sitta Pusilla)* are selected as wildlife management indicator species for this forest community. Population trends for this species are tracked by annual breeding bird surveys (BBS) and bird point counts conducted on the Sumter National Forest.

## Direct and Indirect Effects

### *Abundance*

The future distribution of pine and pine-oak forests on the Sumter National Forest will vary among alternatives in relation to management objectives for the maintenance and restoration of these community types. Tables 3-23 (mountains) and 3-24 (piedmont) list the expected activity levels related to maintenance and restoration of southern yellow pine forests by alternative. Table 3-25 shows the expected percentage in acreage of mid- and late-successional pine forests on the Sumter National Forest.

*Table 3-23. Expected activity levels related to the maintenance and restoration of pine and pine-oak forests in the mountains on the Sumter National Forest (1st decade)*

| Activity | Alt A | Alt B | Alt D | Alt E | Alt F | Alt G | Alt I |
|---|---|---|---|---|---|---|---|
| Average annual acres of shortleaf pine, pitch pine, or Table Mountain pine forests to be restored. | 600 | 400 | 500 | 500 | 600 | 400 | 600 |
| Average annual acres of southern yellow pine to be burned | 4,400 | 7,200 | 4,100 | 6,400 | 3,300 | 2,200 | 5,600 |
| Average annual acres of loblolly pine to be thinned | 2,000 | 2,200 | 1,000 | 2,000 | 0 | 0 | 1,200 |
| Average annual acres of loblolly pine forests to be converted through restoration of fire adapted pine or pine oak communities. | 400 | 600 | 400 | 400 | 0 | 200 | 400 |

*Table 3-24. Expected activity levels related to the maintenance and restoration of pine and pine-oak forests in the piedmont on the Sumter National Forest (1st decade)*

| **Activity** | **Alt A** | **Alt B** | **Alt D** | **Alt E** | **Alt F** | **Alt G** | **Alt I** |
|---|---|---|---|---|---|---|---|
| Average annual acres of shortleaf pine, to be restored. | 200 | 300 | 400 | 300 | 0 | 100 | 300 |
| Average annual acres of southern yellow pine to be burned | 12,500 | 19,700 | 12,700 | 18,900 | 12,200 | 6,200 | 13,000 |
| Average annual acres of loblolly pine to be thinned | 7,700 | 29,200 | 18,300 | 16,900 | 28,400 | 18,600 | 19,400 |
| Average annual acres of loblolly pine forests to be converted through restoration of fire adapted pine or pine oak communities. | 500 | 1,000 | 1,100 | 800 | 0 | 300 | 800 |

*Table 3-25. Expected percentage of mid- and late-successional pine and pine-oak forests on the Sumter National Forest, after 10 and 50 years of implementing forest plan alternatives. (derived from SPECTRUM models)*

| | Mountains | | Piedmont | |
|---|---|---|---|---|
| Alternative | Yr10 | Yr50 | Yr10 | Yr50 |
| Alternative A | 36 | 35 | 44 | 49 |
| Alternative B | 35 | 35 | 54 | 58 |
| Alternative D | 35 | 28 | 47 | 52 |
| Alternative E | 36 | 35 | 49 | 58 |
| Alternative F | 35 | 25 | 43 | 50 |
| Alternative G | 35 | 42 | 52 | 59 |
| Alternative I | 27 | 25 | 49 | 49 |

### *Age Class Distribution and Forest Structure*

Future age class distributions and forest structure will vary among alternatives due to the differences in management intensity and emphasis. The ability to use fire as a management tool will play a critical part in restoring natural species assemblages and forest structure within pine and pine-oak communities

As shown in Tables 3-23 and 3-24, opportunities exist to manipulate vegetation in southern yellow pine forests through prescribed fire and other vegetation management techniques under all alternatives. Projected activities should be sufficient to enhance existing habitat conditions within pine and pine-oak forests above their current levels. Longer rotation ages coupled with more frequent fire will enhance habitat attributes such as grassy understories and standing snags needed by several declining bird species (Dickson 2001). Analysis indicates that, under all alternatives, in 50 years this habitat element will be abundant and well distributed across the forest.

## Cumulative Effects

Pine and pine-oak forests are common on the Sumter National Forest as well as on adjacent private and public lands. The distribution of age classes (Table 3-22) as well as composition and structure within stands varies considerably based upon ownership, with the majority of older pine forests and diversity of forest types occurring on public lands. Management opportunities under all alternatives will ensure continued persistence of these communities on national forest lands with a focus on maintenance and restoration of natural species assemblages. Public lands already provide a vital function in providing the bulk of mid- and late-successional southern yellow pine forests and as restoration proceeds within these communities on national forest lands, the importance of these habitats to species of regional viability concern will increase.

Brown headed nuthatch populations are expected to respond to increases in open canopies of mid to late successional pine and pine-oak communities where dominance in different canopy levels is shared by deciduous and coniferous species. Pine warbler populations are expected to respond to mid to late successional pine and pine-oak that is dominated by conifers with a predominately closed canopy.

# Rare Communities

## Glades, Barrens, and Associated Woodlands

### <u>Affected Environment</u>

These communities are characterized by thin soils and exposed parent material that result in localized complexes of bare soils and rock, herbaceous and/or shrubby vegetation, and thin, often stunted woods. During wet periods they may include scattered shallow pools or areas of seepage. Glades, barrens, and associated woodlands differ from rock outcrop communities by exhibiting soils and vegetative cover over the majority of the site, and differ from the more widespread woodland communities in that they occur on geologic substrates which are unique for the region, including limestone, dolomite, amphibolite, greenstone, mafic rock, serpentine, sandstone, or shale. Associated communities include calcareous woodlands and glades, mafic woodlands and glades, serpentine woodlands and glades, and shale barrens as defined in the Southern Appalachian Assessment (SAMAB 1996). This rare community complex includes rare associations within the following ecological groups as defined by NatureServe (2001a):

401-12 Appalachian Highlands Unstable Substrate Woodlands
401-13 Appalachian Highlands Dry and Mesic Oak Forests and Woodlands
401-17 Appalachian Highlands Calcareous/Circumneutral Dry-Mesic Hardwood Forest
440-05 Appalachian Highlands Carbonate Glades and Barrens
440-10 Interior Highlands Carbonate Glades and Barrens
440-25 Appalachian Sandstone Glades and Barrens
440-65 Appalachian Serpentine Woodlands
440-80 Appalachian Mafic Igneous/Metamorphic Glades and Barrens
xxx-xx Applachian Highlands Unstable Substrate Woodlands

These communities may be found in the Appalachian and Piedmont regions. Limestone or dolomite, and sandstone glades and barrens occur primarily in the Ridge and Valley physiographic provinces ranging from Northern Alabama to Kentucky. Good examples are few and very restricted in distribution. Serpentine glades are known primarily from the Nantahala National Forest in North Carolina. Shale and mafic woodlands are more widespread in distribution, and may be forested if fire has not played a role in their maintenance or restoration. Most occurrences for mafic associations are from the piedmont, but may occur as high as 3800 feet in elevation. Most shale woodlands are in the Carolina slate belt in Georgia, North Carolina, and South Carolina, but neither shale nor mafic woodlands have been well inventoried.

The SAA (1996) concluded that only 25% of the known occurrences for species associated with mafic and other calcareous habitats occurred on national forest lands. Occurrence data for these communities on national forest land is limited On the Sumter National Forest, approximately 800 acres occur on the Andrew Pickens and 400 acres on the piedmont district. Numbers of species of concern associated with rare glades, barrens, and woodlands include approximately 17 species on the piedmont and 110 species in the Southern Appalachians. The majority are vascular plants (88% and 91% in piedmont and Southern Appalachians, respectively) followed by insects and reptiles.

Although rare communities will be protected or restored across all alternatives, the following management and restoration issues are specific to glades, barrens, and associated woodlands. Though underlying soils may differ from the surrounding soils in exchangeable nutrient capacity or pH, they may be overlooked in mapping efforts since they often occur as inclusions within 10-acre stands.

- Lack of inventory information.
- Woodland communities will likely require active restoration, such as basal area reduction (<60ft.$^2$), woody understory and mid-story control, or prescribed fire. Frequent prescribed fire (every 2-3 years) will be needed to maintain these communities once restored.
- Fire occurred only periodically (every 7-12 years) in glade communities, which occur on shallow soils and under rockier conditions.

## Direct and Indirect Effects

Many rare communities of this type are likely to be overgrown or in need of some level of restoration. Slightly adverse short-term effects could occur as a result of active restoration activities, which may temporarily alter the timing of reproduction or growth, but will result in no long-term adverse effects. Short-term direct effects to species associated with these communities are likely to be small and significant compared to the positive indirect benefits of habitat restoration activities, when needed. Since all rare communities will be managed under the rare community (9F) prescription, and the standards associated with the rare community prescription will be applied, effects of national forest management on both the communities and associated species is expected to be positive across all alternatives in the long-term.

Since community inventories will primarily be conducted in project areas, consistent with the standard specific to this prescription, alternatives with fewer anticipated projects may result in the discovery and consequent restoration of fewer rare communities. Although the glade and barren communities are geographically restricted in distribution, and require low intensity disturbance once they are restored, they will be managed or restored to maintain their characteristics based on forestwide goals for rare communities which will be applied across all alternatives. Analysis suggests that on the Sumter National Forest, the glade, barren, and woodland rare communities will be well-distributed (to the extent that their distribution allows it) across all alternatives, but as a result of more extensive inventories, these communities will be better distributed in year 50 compared to year 10 of plan implementation.

## Cumulative Effects

The cumulative effects on the quantity and distribution of these rare communities is predicted by considering opportunities to inventory and restore these communities across alternatives and across private and public ownerships. Our ability to protect and restore these communities on the national forest is limited by our knowledge regarding their occurrence and distribution on the landscape. If only 25% of the known sites for this community type occur on national forest land, glades, barrens, and woodland rare communities are likely to be vulnerable to development, competition with successional vegetation, and possible extirpation. Given the emphasis on rare communities in this forest plan, our knowledge regarding their distribution on national forest land is likely to increase. This suggests that national forests will play a larger role than private land in the conservation of glade, savanna, and woodland rare communities in the future. The cumulative effects of plan implementation are likely to be positive, though more so in year 50 compared to year 10 of plan implementation as a result of better inventories.

### Basic Mesic Forests

## Affected Environment

These communities are characterized by closed-canopy deciduous overstories and rich and diverse understories of calciphilic herbs, underlain by high-base geologic substrates. On moderate to high elevation sites, these communities are typically found in protected coves, and can be distinguished from more acidic mesic cove forests by the abundance of species such as white basswood (*Tilia americana*), yellow buckeye (*Aesculus flava*), black walnut (*Juglans nigra*), faded trillium (*Trillium discolor*), sweet white trillium (*Trillium simile*), black cohosh (*Cimicifuga racemosa*), blue cohosh (*Caulophyllum thalictroides*), whorled horsebalm (*Collinsonia verticillata*), mock orange (*Philadelphus inodorus*), sweet shrub (*Calycanthus floridus*), sweet cicely (*Ozmorhiza* spp.), doll's eyes (*Actaea racemosa*), maidenhair fern (*Adiantum pedatum*), and plantain-leaved sedge (*Carex plantaginea*). Good examples of moderate and high elevation basic mesic forests have a low incidence of white pine (*Pinus strobus*), eastern hemlock (*Tsuga canadensis*), rhododendron (*Rhododendron* spp.), and Christmas fern (*Polystichum acrostichoides*).

On lower elevation sites, these communities are more typically found on north slopes, where dominant and characteristic overstory species are American beech (*Fagus grandifolia*) and northern red oak (*Quercus rubra*), with tulip poplar (*Liriodendron tulipifera*), white oak (*Quercus alba*), shagbark hickory (*Carya ovata*), or white ash (Fraxinus *americana*), with southern sugar maple, chalk maple, painted buckeye (*Aesculus sylvatica*), and pawpaw (*Asimina triloba*) in the midstory and shrub layers, and understories that include faded trillium, nodding trillium(*Trillium rugelii*), black cohosh, doll's eyes, foam flower (*Tiarella cordifolia var. collina*), bloodroot (*Sanguinaria canadensis*), bellworts (*Uvularia sp.*) and trout lilies (*Erythronium spp.)*. Good examples of low elevation basic mesic forests have a low incidence of sweetgum (*Liquidambar* *styraciflua*), loblolly pine (*Pinus taeda*), and non-natives such as Japanese honeysuckle (*Lonicera japonica*) or Chinese privet (*Lingustrum vulgare*).

Basic mesic forest communities are found in both the Appalachian and Piedmont regions. This community includes the following associations defined by NatureServe (2001a, 2001b):

| | |
|---|---|
| CEGL007711 | Southern Appalachian Cove Forest (Rich Foothills Type), |
| CEGL007695 | Southern Appalachian Cove Forest (Rich Montane Type), |
| CEGL008442 | Shumard Oak-Chinquapin Oak Mesic Limestone Forest |
| CEGL008466 | Basic Piedmont Mesic Mixed Hardwood Forest |
| CEGL008488 | Southern Ridge and Valley Basic Mesic Hardwood Forest |
| CEGL004542 | Piedmont Rocky Mesic Mafic Forest. |

The Southern Appalachian Assessment (SAMAB 1996:49) combined mesic and xeric mafic communities, and concluded that only 25% of the known occurrences for species associated with mafic and other calcareous habitats occurred on national forest land. Several species of viability concern are associated with basic mesic forests, with the majority being vascular plants (Appendix F). Identification of these communities is typically based on site-specific inventories. On the Sumter National Forest, the shumard oak-chinquaqin oak mesic limestone forest and the southern ridge and valley basic mesic hardwood forests are not likely to occur here since South Carolina is outside of the range for this community type. At least 10 rare basic mesic community occurrences are known from the Sumter, including seven on the Andrew Pickens Ranger District, three on the Long Cane Ranger District, and two on the Enoree Ranger District, but more are possible. Occurrences on the Andrew Pickens occur primarily along the Brevard geologic escarpment.

## Direct and Indirect Effects

All high quality basic mesic forest communities will be managed under the 9F (rare community) prescription under all alternatives. Primary management needs are protection from undesirable disturbance. These communities are characterized by low intensity, low frequency disturbances, and are often most threatened by recreational use, since many are desirable for interpretive trails. Several standards for rare communities ensure their maintenance or restoration across the forest. The 9F prescription encourages the exclusion of basic mesic forests from prescribed burning blocks where this can be accomplished without large increases in fire line construction, and discourages direct firing unless necessary to secure control lines. Only low intensity fires are allowed. Alternative E, which emphasizes recreation, may present the greatest management challenge to protection of these communities and associated species. Additional rare communities standards are designed to reduce or eliminate adverse effects to rare communities caused by recreational use.

Since rare communities would be protected or restored across all alternatives, the effects of national forest management on these communities and associated species would be positive under all alternatives. However, under all alternatives this community will remain relatively rare on the forest because of its naturally limited distribution.

## Cumulative Effects

The cumulative effect on the quantity and distribution of basic mesic forests is determined by considering trends in the status of these communities through time and across private and public ownerships. Even though people increasingly use the national forest for recreational or social needs, protection actions will have positive effects. However, based on regional conditions reported in SAMAB (1996: 49) the Sumter National Forest likely contains a relatively small proportion of known occurrences of this community type; examples of the type on private lands are unlikely to receive the same level of protection. It is expected that the cumulative effects of development, recreational use, timber harvest, and other activities on private lands will result in a decrease of good examples of these community types across the landscape, making national forest examples increasingly valuable to regional conservation.

# Canebrake Communities

## Affected Environment

Although at the time of European settlement canebrakes were common in the southeast, they rapidly disappeared following settlement due to factors such as overgrazing, clearing of land for farming, altered burning regimes, and changes in floodplain hydrology (Brantley and Platt 2001). Faunal surveys in canebrakes are quite limited and canebrake ecology has been largely ignored by contemporary workers (Platt and Brantley 1997). At least six species of butterfly may be canebrake obligates (Scott 1986; Opler and Malikul 1992), and 5 of the 6 are thought to be declining due to destruction of cane habitat (Opler and Malikul 1992). In the Coastal Plain and Piedmont, canebrakes also provide habitat for nesting Swainson's warbler (*Limnothlypis swainsonii*), a bird that is threatened by destruction of this habitat (Hamel 1992; Brown and Dickson 1994). Large canebrakes are extremely rare today, and therefore it is critical to maintain these communities where they occur on Forest Service land.

Canebrakes are characterized by almost monotypic stands of giant or switch cane (*Arundinaria gigantea*), usually with no-or-low densities of overstory tree canopy. They are typically found in bottomlands or stream terraces. This community is found in the Appalachian, Piedmont, and Coastal Plain regions. Primary management needs are restoration and maintenance through overstory reduction and periodic prescribed fire. Although several associations described by NatureServe (2001) include cane as a major component, this community most closely corresponds to:

CEGL003836 Floodplain Canebrake.

The Sumter NF has approximately 16,800 acres of cane communities with potential for restoration, based on 25% of the acreage in riparian corridor. Giant cane is commonly found scattered throughout the understory of forested bottomland forests on alluvial soils in the piedmont, and on side-slopes throughout the Andrew Pickens district, particularly at lower (less than 1500 feet) elevations. Bottomland terraces most commonly associated with canebrakes occur primarily on the piedmont ranger districts.

Several viability concern species are associated with canebrakes (Appendix F). There are 16 species listed as viability concern species for the Southern Appalachian ecoregion. Four viability concern species are listed for the Piedmont ecoregion.

## Direct and Indirect Effects

Although cane is found commonly as an understory component in bottomlands and stream terraces, provisions of the rare community prescription would apply only to larger patches (generally greater than 0.25 acres) exhibiting high densities that result in nearly monotypic conditions, or to areas selected for restoration of such conditions. All existing canebrake communities meeting this definition would be managed under all alternatives for protection and maintenance. Restoration objectives are defined for the draft forest plan (Alternative I) and would vary by alternative (Table 3-26). Canebrakes generally fall within riparian corridors and therefore also would be subject to riparian prescription provisions.

Direct effects would be those of management activities conducted to restore and maintain the canebrakes. These management options would include prescribed burning and/or herbicide treatment to control competing herbaceous and woody vegetation and restore culm vigor, and overstory and midstory removal to restore declining stands of cane.

By conducting prescribed burns on a 7 to 10 year interval, impacts to the canebrake should be beneficial, since more frequent fires eventually result in death of the plants (Platt and Brantley 1997). Prescribed burning would be carried out following standards and guidelines for prescribed fire, including prohibition of fire line construction in rare communities. Overstory and midstory removal, where needed for restoration, would be conducted under the standards and guidelines developed for rare communities, thus preventing direct adverse effects to the canebrakes during implementation of the vegetation removal. Restoration, and maintenance actions would result in long-term beneficial effects to the species associated with canebrake communities through improvement of their habitat. Canebrake restoration efforts would occur only on sites currently supporting cane.

*Table 3-26. Acres of canebrake restoration expected under Forest Plan alternatives for the Sumter National Forest, Enoree and Long Cane Districts*

| Objective | Alt A | Alt B | Alt D | Alt E | Alt F | Alt G | Alt I |
|---|---|---|---|---|---|---|---|
| Average annual acres of canebrake restoration | 65-330 | 65-330 | 65-330 | 65-330 | 65 | 65-330 | 65-330 |

Trends in abundance and condition of canebrakes would be positive under all alternatives, except Alternative F (No Action), due to new focus on maintenance and restoration of this community. However, because of relatively low levels of restoration expected under all alternatives coupled with current rarity, canebrake communities are expected to remain rare for the foreseeable future relative to their historical distribution. Higher levels of restoration are not anticipated under any alternatives because other resource considerations receive priority within the riparian areas where most restoration opportunities exist.

## Cumulative Effects

Management direction for canebrake communities is similar across revision forests. Because priority is put on these communities, effects of national forest management on them and the associated species is expected to be beneficial under all alternatives except Alternative F. However, this community under all alternatives and in all ecoregions will remain rare relative to its historical distribution, making these habitats on national forest land critical to associated species.

# Caves and Mines

## Affected Environment

This community is characterized by natural and human-made openings in the ground that extend beyond the zone of light, creating sites buffered in relation to the outside environment. Included are karst and sinkhole features and sinking streams that lead to subterranean environments. Surfaces of karstlands are directly linked to cave water systems and aquifers (Kastning and Kastning 1990).

The shape and location of entrances, along with the hydrology, configuration, size, elevation, and patterns of airflow influence the types of fauna found within caves and mines (SAMAB 1996: 180). Many bats are dependent on caves, both seasonally and year-round. Bats select roosts with temperatures appropriate to their metabolic processes (Tuttle and Stevenson 1977). An intermediate, unusable range of temperatures characterizes most caves, and bats use a very small number of caves with desirable conditions.

In the Southern Appalachians, most caves are found in carbonate valleys of the Ridge and Valley and the Cumberland Plateau (SAMAB 1996: 180). The Blue Ridge contains fissure caves and a smaller number of solution caves found in limestone or dolomite collapsed valleys and windows. Because of their rarity and vulnerability, their protection is a key conservation need within this region (SAMAB 1996: 37). Sinkholes and karstlands are scattered throughout the planning area, and large examples are rare. They are most common in the northern and central Ridge and Valley (Jefferson National Forest), as well as the Cumberland Plateau (Bankhead National Forest), with fewer occurrences known from the Blue Ridge (SAMAB, 1996: 189). Caves are absent from the piedmont and from the Sumter National Forest.

Abandoned mines have become key year-round resources for bats displaced from natural roosts, including caves and large hollow trees, by human disturbance (Tuttle and Taylor 1994). Abandoned mines may provide microclimates similar to those of caves. Mines are used for maternity sites, hibernation sites, migratory stopover sites, and temporary night roosts. Some bats rely heavily on use of mines range-wide, and many bat species are believed to hibernate exclusively in old mines or caves (Tuttle and Taylor 1994). One mine significant for Rafinesque's big-eared bat is known from the Andrew Pickens Ranger District, though others may be possible (Bunch et.al. 1998).

## Direct and Indirect Effects

Possible threats to national forest caves and mines are: 1) direct disturbance from human visitation or improperly installed gates/closure devices, 2) management activities that indirectly result in alteration of temperature, humidity, surface water recharge or water quality, and 3) temporary decline in air quality due to prescribed burning (SAMAB 1996:90).

Provisions of the rare community prescription (9F) and forestwide direction apply to caves and mines that support cave-associated species and are the same across all alternatives. Direct disturbance from human visitation is regulated by a standard that requires use of proper closure devices for caves and mines supporting species at viability risk. Consistent inclusion of this standard under all alternatives is expected to reduce frequency and degree of human intrusion, providing beneficial effects to associated species.

Management actions that may result in indirect alteration of temperature, humidity, surface water recharge, or water quality within caves or mines include vegetation clearing and management, construction of roads, trails, and other recreation developments, and other use of heavy equipment. Standards under all alternatives provide for undisturbed buffers around significant caves and mines and associated features to maintain vegetative cover and moist microclimatic conditions. All mines are to be surveyed to determine use by bats and potential significance. For all mines suitable for supporting rare bat species, applicable standards will be followed including a buffer of 200 feet within which many activities are prohibited.

All caves and mines suitable for supporting characteristic fauna would be managed optimally for protection under all alternatives. Because of the priority put on protection of this community and associated species, effects of national forest management are expected to be positive under all alternatives.

**Cumulative Effects**

Caves and other karst features are naturally rare elements. In addition, a significant proportion of Southern Appalachian caves (95%) are located on private lands (SAMAB 1996: 37, 49) where protection may be poorly regulated. For these reasons, effects of protection of these habitats on national forest land is important to maintaining viability of associated species within the region.

### Table Mountain Pine

**Affected Environment**

This community is characterized by a dominant or significant component of Table Mountain pine (*Pinus pungens*) in the overstory often in combination with pitch pine (*Pinus rigida*). It is found in the Appalachian region, commonly above 1,000 feet in elevation. Preliminary data by Frost (2002) suggests that pitch pine-Table Mountain pine /heath communities once occupied as much as 20% of the presettlement landscape. Primary management needs are maintenance and expansion of existing occurrences, using thinning and prescribed fire. This community corresponds to Table Mountain pine/pitch pine woodlands as defined in the Southern Appalachian Assessment (SAMAB 1996:185-186), and all associations within the following ecological group as defined by NatureServe (2001a):

401-80 Appalachian Highlands Pitch and Table Mountain Pine Woodlands.

In Table Mountain pine stands of the Great Smoky Mountains, associated tree species are red maple (*Acer rubrum*), blackgum (*Nyssa sylvatica*), sourwood (*Oxydendrum arboreum*), pitch pine, and chestnut oak (*Quercus prinus*). In Table Mountain pine-pitch pine stands, additional associated species include scarlet oak (*Quercuscoccinea*), American chestnut (*Castanea dentata*), and black locust (*Robinia pseudoacacia*). (Burns and Honkala 1990)

The lower canopy vegetation in Table Mountain pine stands includes rosebay rhododendron (*Rhododendron maximum*), Catawba rhododendron (*R. catawbiense*), Piedmont rhododendron (*R. minus*), mountain-laurel (*Kalmia latifolia*), mountain winterberry (*Ilex montana*), hobblebush (*Viburnum alnifolium*), blueberries (*Vaccinium* spp.), sawbrier (*Smilax glauca),* greenbrier (*S. rotundifolia*), fetterbush (*Pieris* *floribunda*), white-alder (*Clethra acuminata*), black huckleberry (*Gaylussacia baccata*), bear huckleberry (*G. ursina*), wild grape (*Vitis* spp.), and male blueberry (*Lyonia ligustrina*). Mean shrub cover in the Great Smoky Mountains amounted to 65% in Table Mountain pine stands and 84% in Table Mountain pine-pitch pine stands. (Burns and Honkala 1990)

Bear oak (*Quercus ilicifolia*), mapleleaf viburnum (*Viburnum acerifolium*), and low sweet blueberry (*Vaccinium angustifolium*) are most important stand components only in the northern part of the range of Table Mountain pine.

Previous studies of Table Mountain pine regeneration following wildfires suggests that prescribed fires may need to be of high intensity to remove the forest canopy and expose mineral soil for successful regeneration (USDA 1965; Zobel 1969; Sanders 1992). Several recent studies suggest that although fire is needed for regeneration of Table Mountain pine stands, the intensity may vary depending on site conditions. Medium-high intensity burns may get desired results (Welch and Waldrop 2001).

Table Mountain pine has a very limited distribution in the Sumter National Forest. There are approximately 33 acres of Table Mountain pine stands in the timber stand inventory data (CISC), but the species occurs more commonly in mixed stands with pitch pine, shortleaf pine, and oaks. The known occurrences of Table Mountain pine communities on the Sumter National Forest include Poor Mountain, Toxaway Creek area, and along ridgelines higher than 1,000 feet in elevation.

## Direct and Indirect Effects

Table Mountain pine forests are considered a rare community and are managed in all plan alternatives through the 9F (rare community) prescription. A forestwide objective included under the proposed forest plan is to restore from 500 to 2500 acres of Table Mountain pine forests. Table Mountain pine stands will be protected, maintained, or restored on appropriate sites and will not be cut or treated during vegetation management activities in order to maintain future restoration opportunities. Table 3-27 shows the expected activity levels related to the maintenance and restoration of Table Mountain pine forests.

*Table 3-27. Expected Activity Levels related to the maintenance and restoration of Table Mountain pine forests for the Sumter National Forest by Alternative*

| Activity | Alt A | Alt B | Alt D | Alt E | Alt F | Alt G | Alt I |
|---|---|---|---|---|---|---|---|
| Average annual acres of Table Mountain pine forests to be restored | 50-250 | 50-250 | 50-250 | 50-250 | 25 | 50-250 | 50-250 |
| Average annual acres of Table Mountain pine forests to be burned | 100-500 | 100-500 | 100-500 | 100-500 | 25 | 100-500 | 100-500 |

Table 3-27 indicates that all alternatives would increase the Table Mountain pine on the Sumter National Forest, compared to current management. Alternative G would have the most limited opportunities to manage for Table Mountain pine while Alternative B would provide the highest opportunities to manage for this community. Restoration and maintenance activities would benefit this community, however Table Mountain pine forests will remain rare and poorly distributed on National Forest System lands due to their naturally limited distribution.

## Cumulative Effects

Table Mountain pine is limited in distribution on the Sumter National Forest and is concentrated in relatively small areas, typically with small acreages. Due to the dependence on prescribed fire, opportunities for expansion of this community on private lands are likely to be limited. Although limited in acreage, designation of Table Mountain pine as a rare community suggests that the maintenance and restoration on national forest lands will be a priority, and that the cumulative effects of implementing all alternatives above and beyond current management will be positive.

# Rock Outcrops and Cliffs

## Affected Environment

Rock outcrops and cliffs are defined here as rare communities and include the following types of communities as defined in the Southern Appalachian Assessment (SAMAB 1996:179-186) and by NatureServe (2001).

### *Talus Slopes*

This community is characterized by nonvegetated or sparsely vegetated accumulations of rock at 2,500 to 4,600 feet elevation. It is found in the Appalachian region and is distinguished from forested boulderfields by the lack of trees, and from rocky summits by its occurrence on side-slopes as opposed to ridges and peaks. This community includes talus slopes as defined in the Southern Appalachian Assessment (SAMAB 1996:186), and all associations within the following ecological group as defined by NatureServe (2001):

430-10 Eastern Acid Talus

### *Forested Boulderfields*

This community is characterized by rock fields, found at 3,500 to 5,300 feet elevation, that support a variable density of trees, typically dominated by yellow birch. It is distinguished from talus slopes by the presence of trees. It is found in the Appalachian region. This community includes boulderfields as defined in the Southern Appalachian

Assessment (SAMAB 1996:179), and the following associations as defined by NatureServe (2001a, 2001b):

| | |
|---|---|
| CEGL004982 | Southern Appalachian Hardwood Boulderfield Forest (Typic Type) |
| CEGL006124 | Southern Applachian Boulderfield Forest (Currant and Rockcap Fern Type) |

### *Cliffs and Bluffs*

These communities are characterized by steep, rocky, sparsely-vegetated slopes, usually above streams or rivers. Cliff communities may be dry or wet and include communities associated with waterfalls, such as spray cliffs and rock houses. These communities are found in the Appalachian region. This community includes calcareous cliffs, mafic cliffs, sandstone cliffs, and spray cliffs as defined in the Southern Appalachian Assessment (SAMAB 1996:179,182,183,185), and all associations within the following ecological groups as defined by NatureServe (2001a):

| | |
|---|---|
| 430-40 | Eastern Dry Acid Cliffs |
| 430-45 | Eastern Moist Acid Cliffs |
| 430-50 | Eastern Dry Alkaline Cliffs |
| 430-55 | Eastern Moist Alkaline Cliffs |
| 430-60 | Appalachain Highlands Northern White-Cedar Bluffs |
| 430-65 | Appalachian Highlands Rock Houses |

### *Rock Outcrops*

These communities are characterized by significant areas of exposed, usually smooth, exfoliating granite or related rocks, with scattered vegetation mats and abundant lichens. These communities are found in both the Appalachian and Piedmont regions. This community includes granitic dome and granitic flatrock as defined in the Southern Appalachian Assessment (SAMAB 1996:180-181), and all associations within the following ecological groups as defined by NatureServe (2001a):

| | |
|---|---|
| 435-10 | Appalachian Highlands Granitic Domes |
| 435-20 | Appalachian Highlands Grantic Flatrock |

### *Rocky Summits*

This community is characterized by sparsely vegetated outcrops of fractured, irregular rock found above 4,000 feet elevation on peaks, ridges, and upper slopes. It is distiguished from rock outcrop communities by its fractured, irregular rock surface, and from talus slopes and cliff communities by its topographic position on or near summits. It differs from forested boulderfields in its general lack of forest cover. This community is found in the Appalachian region. This community includes high elevation rocky summits as defined in the Southern Appalachian Assessment (SAMAB 1996:182), and all associations within the following ecological group as defined by NatureServe (2001a):

436-30 Appalachian Highlands Rocky Summits

The known distribution of rare rock outcrop and cliff communities is described in the Southern Appalachian Assessment Terrestrial Technical Report (SAMAB 1996:188-190). According to this source approximately one-third of all occurrences of these communities in the southern Appalachian area are located on national forest lands.

Many species of viability concern are associated with rock outcrop and cliff communities (Appendix F). On the Sumter National Forest, talus slopes, forested boulderfields, moist alkaline cliffs, northern white-cedar bluffs, and rock houses are not likely to occur here, due to the lack of geological features which support their occurrence. On the Andrew Pickens, at least nine moist acid cliffs are known in association with waterfall spray zones or seepages (Zartman and Pittillo 1995), and dry alkaline cliff.

Potential is there for additional moist acid cliffs, and both dry alkaline and acid cliffs. On the piedmont districts, one low quality granitic flatrock community is known from the Enoree Ranger District, and there is the potential for additional flatrock or granitic dome communities on both Long Cane and Enoree Ranger Districts.

## Direct and Indirect Effects

Rock outcrop and cliff communities are considered rare communities and will be managed optimally for protection, restoration, and/or maintenance through the 9F (rare community) prescription. This direction is the same under all plan alternatives, thus the effects of national forest management on these communities and associated species is expected to be positive. A subset of these communities is associated with riparian areas (spray cliffs, waterfalls, etc.), providing them with the additional protection afforded by the riparian prescription under all plan alternatives. Primary management strategies for these communities under all alternatives would be protection from disturbance by management activities and recreational uses; little to no vegetation management for maintenance or restoration is expected. These communities will remain rare and poorly distributed on national forest lands however, due to their naturally limited distribution.

## Cumulative Effects

Cumulatively, these communities are vulnerable to negative impacts on private lands, making National Forest System sites critical to maintain.

## Wetlands

### Affected Environment

It is estimated that more than 50% of the Nation's wetlands have been destroyed in the past 200 years (Ernst and Brown 1988). They are vulnerable to destruction on private land and, therefore, it is critical to maintain these communities where they occur on national forest land. Wetlands have been ditched and drained for pastures, mined for peat (Ewel 1990), and filled for shopping centers. Loss of some wetlands can also be attributed to sedimentation, pollution, and plant succession due to fire suppression (USFWS 1991). Beaver activity has historically played an important role in creating open wetland habitats that are now rare on the landscape. Beaver wetlands are beneficial for many rare species such as monkey face orchid (Shea 1992), but may be detrimental to others such as bog turtle (Jensen, pers. commun.). Beaver impoundments also may cause unacceptable impacts to facilities and other resources.

Rare wetland communities in the Southern Appalachians and Piedmont include bogs, fens, seeps, ponds, river gravel-cobble bars, and river scour areas as defined in this section. Additional rare wetland communities may be found in association with small streams or floodplains in the piedmont of South Carolina.

Bogs, fens, seeps, and ponds may be found in both the Appalchian and Piedmont regions, and are characterized by 1) soils that are semi-permanently to permanently saturated as a result of groundwater seepage, perched water tables, rainfall, or beaver activity, but otherwise are generally nonalluvial, and 2) presence of wetland-associated species such as sphagnum, ferns, and sedges. Dominant vegetation may be herbs, shrubs, trees, or some complex of the three. Ponds in this group include limesink, karst, and depression ponds, which may hold areas of shallow open water for signficant portions of the year. Also included are all impoundments and associated wetlands resulting from beaver activity. Artificial impoundments are not included, unless they support significant populations or associations of species at risk. The primary management need is that of protection from activities that could disrupt wetland hydrology or other community structures and functions. Some sites may require periodic vegetation management to maintain desired herbaceous and/or shrubby composition. Rare wetland communities include mafic and calcareous fens, sphagnum and shrub bogs, swamp forest-bog complex, mountain ponds, seasonally dry sinkhole ponds, and beaver pond and wetland complex as defined in the Southern Appalachian Assessment (SAMAB 1996), and rare associations within the following ecological groups as defined by NatureServe (2001):

| | |
|---|---|
| 458-15 | Appalachian Highlands Wooded Depression Ponds |
| 458-20 | Appalachian and Interior Highlands Limesink and Karst Wooded Ponds |
| 470-10 | Appalachian Highlands Forested Bogs |
| 470-20 | Appalachian Highlands Forested Acid Seeps |
| 470-50 | Appalachian Highlands Forested Fens and Calcareous Seeps |
| 475-10 | Appalachian Highlands Acid Herbaceous Seeps |
| 475-20 | Appalachian Highlands Alkaline Herbaceous Fens and Seeps |

475-30 Appalachian and Interior Highlands Herbaceous Depression Ponds and Pondshores

Riverine and alluvial rare communities are characterized by: 1) sites adjacent to or within stream channels that are exposed to periodic flooding and scour, 2) presence of significant populations or associations of species at risk, and 3) groups of species locally uncommon in the piedmont, including bottomland oaks and bald cypress. Primary management needs are protection from disturbance during development of road crossings, and maintenance of desirable in-stream flows. Some restoration may be necessary. These communities include rare associations within the following ecological groups as defined by NatureServe (2001):

420-20 Appalachian Highlands Small Stream and Lower Slope Forest
420-xx Appalachian Highlands Large River Floodplain Forest
457-10 Appalachian Highlands Riverine Vegetation
457-30 Rocky Riverbeds
457-40 Appalachian Highlands Riverscour Vegetation

The SAA terrestrial report summarizes the approximate number of occurrences of some of these wetland communities on national forest lands in the Southern Appalachians (SAMAB 1996: 190). On the Sumter National Forest there are several known occurences of rare wetland communities, though limesink and karst wooded ponds, forested fens and calcareous seeps, alkaline herbaceous fens and seeps, and herbaceous depression ponds and pondshores are either not likely to occur here, due to lack of appropriate geology or elevation, or the associated rare communities are not currently considered rare by Natureserve. At least six rare wooded depression ponds are known from the Long Cane Ranger District on the Carolina slate belt, but more are likely to occur there. Rare wooded depression ponds are usually dominated by willow oak, and some examples are codominated by dwarf palmetto and oglethorpe oak (*Quercus oglethorpensis)*. At least three forested bogs are known from the Andrew Pickens Ranger District (sometimes containing *Juncus gymnocarpus)*, and three acid herbaceous seeps containing umbrella leaf (*Diphylleia cymosa)*, but more forested bogs and acid herbaceous seeps and bogs are possible. Forested acid seeps are possible on both Enoree and Long Cane Ranger Districts of the piedmont. Two good examples of rare rocky riverbed communities, dominated by shoal's spider lily (*Hymenocallis coronaria)* occur on the Long Cane Ranger District (Steven's Creek and the Savannah River). Examples of rare large river floodplain forests, dominated by bottomland oaks or American beech (on alluvial soils) are possible on both piedmont districts. Rare communities dominated by bald cypress are known from the Long Cane Ranger District, especially along Turkey and Stevens Creeks. Wetland rare communities support a large number of species of viability concern (Appendix F).

## Direct and Indirect Effects

Wetland rare communities would be managed under all alternatives under the 9F rare community prescription for protection, maintenance, and where possible, restoration. These wetlands generally fall within riparian corridors, so provisions of the riparian prescription also would apply. Standards under all alternatives provide for protection of hydrologic function of wetland rare communities and prohibit fish stocking to maintain suitability for amphibian breeding. Beaver-created wetlands would normally be treated as rare communities, but beaver populations and impoundments could be managed to avoid adverse impacts to public safety, facilities, private land resources, at-risk species, and other rare communities.

Because wetland rare communities would be protected and maintained in all alternatives, no adverse direct or indirect effects to these communities are expected. Restoration efforts and creation of new wetlands through beaver activity may result in increased occurrence of these communities to the benefit of associated species. However, analysis indicates that, under all alternatives, wetland rare communities would remain uncommon on the forest because of their naturally limited distribution.

## Cumulative Effects

Because all alternatives place priority on protection and maintenance of these communities, cumulative effects on national forest lands are expected to be positive. However, a significant proportion of Southern Appalachian wetland rare communities are located on private lands (SAMAB 1996: 190) where protection may be poorly regulated. For these reasons, protection of these habitats on national forest land is important to maintaining viability of associated species within the region.

## Successional Habitats

### Mix of Early and Late Successional Forests

#### <u>Affected Environment</u>

Successional stages of forests are the determining factor for presence, distribution, and abundance of a wide variety of wildlife. Some species depend on early-successional forests, some depend on late-successional forests, and others depend on a mix of both occurring within the landscape (Franklin 1988; Harris 1984; Hunter et.al. 2001; Hunter 1988; Litvaitis 2001). These habitat conditions are also important as wintering and stopover habitats for migrating species (Kilgo 1999; Suthers 2000; Hunter et.al. 2001). Therefore, it is important that varying amounts of both types of habitat be provided within national forest landscapes.

This section deals only with successional forest conditions. Permanent openings such as open woodlands, savannas, grasslands, barrens and glades, balds, wildlife openings, old fields, pastures, and rights-of-way are covered elsewhere in this document. Mid- and late-successional conditions are covered only generally in this section; more detailed treatment of desired conditions for these successional stages can be found under individual forest community sections.

For analysis purposes, forest succession is divided into four stages: early, sapling/pole, mid, and late (Table 3-28; after SAMAB 1996:11, 284). Early-successional forest is defined as regenerating forest of 0-to-10 years of age for all forest community types. It is characterized by dominance of woody growth of regenerating trees and shrubs, often with a significant grass/forb component, and relatively low density or absent overstory. This condition is distinguished from most permanent opening habitats by dominance of relatively dense woody vegetation, as opposed to dominance of grasses and forbs. Such conditions may be created by even-aged and two-aged regeneration cutting, and by natural disturbance events such as windstorms, catastrophic wildfire, and mortality caused by some insect or disease outbreaks. Ages defining the remaining successional stages vary slightly by forest community type. Sapling/pole forest is characterized by canopy closure of dense tree regeneration, with tree diameters typically smaller than 10 inches. Mid-successional forest begins to develop stratification of over-, mid-, and understory layers. Late-successional forests, usually greater than 80 years old, are characterized by trees with spreading crowns, a suppressed mid-story, an increase in mortality rates, emergence of super-canopy trees, and an understory dominated by shade tolerant species. Depending upon site conditions, this stage often contains the largest diameter trees and has well-developed canopy layers with an occasional random opening caused by tree mortality.

*Table 3-28. Forest age (years) corresponding to successional stages for each forest community type.*

| Forest Community Type | Successional Stage Early | Sapling/Pole | Mid | Late |
|---|---|---|---|---|
| Conifer-Northern Hardwood Forest, Mixed Mesophytic Forest | 0-10 | 11-40 | 41-80 | 81+ |
| River Floodplain Hardwood Forest, Eastern Riverfront Forest | 0-10 | 11-20 | 21-60 | 61+ |
| Dry-Mesic Oak Forest | 0-10 | 11-40 | 41-80 | 81+ |
| Pine and Pine-Oak Forest | 0-10 | 11-40 | 41-80 | 81+ |
| Dry and Xeric Oak Forest | 0-10 | 11-40 | 41-80 | 81+ |
| Dry and Dry Mesic Oak and Oak-Pine Forest | 0-10 | 11-40 | 41-80 | 81+ |

Of particular importance as habitat are forest conditions that exist at both extremes of the forest successional continuum – early-successional and late-successional forests. Appendix F identifies species of viability concern associated with early-successional forests, mixed successional forest landscapes, and late-successional forests of a variety of forest community types.

Early-successional forests are important because they are highly productive in terms of forage, diversity of food sources, insect production, nesting and escape cover, and soft mast. Early-successional forests have the shortest lifespan (10 years) of any of the forest successional stages, are typically in short supply, and are declining on national forests in the Southern Appalachians (SAMAB 1996:28), and in the eastern United States (Thompson 2001). Early-successional forests are also not distributed regularly or randomly across the landscape (Lorimer 2001). These habitats are essential for some birds (ruffed grouse, chestnut-sided warbler, golden-winged warbler, prairie warbler, yellow-breasted chat, blue-winged warbler, Swainson's warbler); key to deer, turkey, and bear in the South; and sought by hunters, berry pickers, crafters, and herb gatherers for the wealth of opportunities they provide (Gobster 2001). Many species commonly associated with late-successional forest conditions also use early-successional forests periodically or depend upon it during some portion of their life cycle (Hunter et.al. 2001).

Sapling/pole stages are generally of least value to wildlife because closed canopies limit understory development, and trees are not yet large and old enough to begin producing mast or other wildlife benefits. However, this successional stage does provide value as nesting, escape, resting, and winter foraging cover for some species. It is in this stage where most grape "slicks" and the largest amount of dead and decaying wood are found on the forest. Mid-successional forests begin to look and function like late-successional forests with multi-layered canopies and production of hard and soft mast. In most cases, this stage provides habitat for many species that use late-successional forests, except for those that require several large diameter trees to fulfill their life cycle needs.

Like early-successional forests, late-successional forests provide habitats and food supplies for a suite of habitat specialists as well as habitat generalists. These habitats are important providers of high canopy nesting, roosting, and foraging habitat; suitable tree diameters for cavity development and excavation; and relatively large volumes of seed and hard mast. Although it takes many decades for late-successional forest conditions to develop, these habitats are more common and contiguous across the Sumter National Forest and are dominant features in the SAA area (SAMAB 1996:28).

At the time of the SAA, national forest lands had only 3% of forest habitats in the early-successional stage, while 89% was in the mid- and late-successional classes; 45% of this was late-successional forest (SAMAB 1996:168). Other public lands were similar to the national forest. Conversely, private industrial lands had 22% in early-successional forest and only 4% in late-successional forest; private non-industrial had 8% in early-successional forest and 9% in late-successional forest (SAMAB 1996:168-169). The 20-year trends (SAMAB 1996:28) show early-successional forest on national forests decreasing by 4%, with late-successional forest increasing by 34%. Trends for private forests are mixed, with increases in both early- and late-successional forest percentages. These results likely reflect the mixed objectives of private landowners, with some focusing on commodity production and others on amenity values. In general, on national forest lands forest conditions are weighted heavily toward total acres of older forests, while private forests are providing a more balanced distribution of forest successional conditions from young to old (Trani-Griep 1999).

Quality of forest successional habitats may also vary between private and national forest lands. Objectives on national forests to provide for wildlife habitat needs, recreational activities, scenic integrity objectives, and water quality often result in greater vegetation structure retained in early-successional forests than in similar habitats on private lands. On private lands, more intensive management may simplify structure and composition, reducing habitat quality. Similarly, effort to restore and maintain desired ecological conditions and processes in mid- and late-successional forests also often enhances habitat quality over that found on private lands. For these reasons, conclusions regarding cumulative habitat availability from both private and national forest lands must be made with caution.

Hurricanes (Foster 1992), lightning frequency (Delcourt 1998), fire frequency (Whitney 1986), and pre-settlement cultural activities (Delcourt 1987) were probably the major sources of disturbance events that created early successional forests prior to European occupation. Less drastic perturbations such as mortality events from tornadoes, insect or disease outbreaks, or defoliation (passenger pigeon roosts) were typically less extensive and cyclic but nonetheless provided a source of early-successional forest conditions. Natural disturbances, however, are unpredictable, episodic, and heterogeneous (Lorimer 2001); influential at a landscape scale; and are neither uniform nor random in distribution. Anthropogenic disturbances occurred more frequently in floodplains along major rivers and in "hunting grounds."

Overall, landscape patterns more consistently contain a component of early-successional forests in places more "likely" to be susceptible to disturbances, i.e., south and west facing slopes, sandy or well drained soils, or in fire adapted plant communities. Fire suppression, intensive agriculture resulting in massive soil losses, land use changes, and urban sprawl have drastically altered the variables that would perpetuate a landscape with a significant component of early- successional forests. With many species associated with early successional forests in the southeast in decline (Hunter et.al. 2001), it is imperative that management actions include some provision for perpetuating early-successional forest conditions. At the same time, many of these same factors, especially land use conversion, have reduced the distribution and abundance of quality late-successional forests across the larger landscape. Maintenance of these on public lands is equally important.

Abundance of early successional habitats is low throughout the Sumter National Forest and poorly distributed between communities (Table 3-29). Mid- and late-successional habitats appear to be well distributed and abundant among all forest communities.

*Table 3-29. Current percentages of each community type on the Sumter National Forest by successional stage, 2002. (Old growth acres are included in "late.")*

| | Successional Stages in the Mountains | | | |
|---|---|---|---|---|
| **Forest Community Type** | Early | Sapling/Pole | Mid | Late |
| Conifer-Northern Hardwood Forest, Mixed Mesophytic Forest, | 0.6 | 27 | 16 | 56 |
| River Floodplain Hardwood Forest, Eastern Riverfront Forest | 0 | 0 | 0 | 0 |
| Dry-Mesic Oak Forest | 0.3 | 7.0 | 16 | 77 |
| Pine and Pine-Oak Forest | 4.2 | 15 | 28 | 53 |
| Dry and Xeric Oak Forest | 0 | 13 | 31 | 56 |
| Dry and Dry-Mesic Oak-Pine Forest | 1.2 | 1.2 | 29 | 69 |

| | Successional Stages in the Piedmont | | | |
|---|---|---|---|---|
| **Forest Community Type** | Early | Sapling/Pole | Mid | Late |
| Conifer-Northern Hardwood Forest, Mixed Mesophytic Forest | 0 | 0.1 | 56 | 44 |
| River Floodplain Hardwood Forest, Eastern Riverfront Forest | <0.1 | 2.3 | 8.3 | 89 |
| Dry-Mesic Oak Forest | 0.1 | 2.8 | 57 | 40 |
| Pine and Pine-Oak Forest | 6.9 | 19 | 34 | 40 |
| Dry and Xeric Oak Forest | 0 | 2.0 | 89 | 9.0 |
| Dry and Dry-Mesic Oak-Pine Forest | 1.0 | 10 | 60 | 29 |

Indicators of conditions related to successional forest habitats are acreage or percent of forested acres on the national forest within three categories of forest successional stages: 1) early successional forest, 2) mid- and late-successional forest combined, and 3) late-successional forest alone. These three indicators are selected because they are most relevant to describing important habitat conditions. Early-successional forests are a key condition required by many species, and their level indicates near-future presence of sapling/pole successional stages as well. Because most species associated with late-successional conditions will also be found to some extent in mid-successional forests, the combined level of these successional stages provides an indication of the total base of habitat available for these species. However, because late-successional forest conditions will often provide better quality habitat for these species, a focus on levels of this stage alone is also meaningful.

The prairie warbler (*Dendroica discolor*) is selected as management indicator species to represent early-successional forests. Because the mid- and late-successional forest habitats support more divergent communities depending on their composition, management indicator species for these habitats are identified and analyzed under the individual major forest community sections of this document.

Prairie warblers are shrubland nesting birds found in suitable habitats throughout the Southern Appalachians and Piedmont (Hamel 1992). Prairie warblers require dense forest regeneration or open shrubby conditions in a forested setting. Near optimal habitat conditions are characterized by regeneration, thinned area or patchy openings 10 acres or more in size where woody plants average 2 to 3 meters in height, 3 to 4 cm dbh, and occur in stem densities around 3,000 stems/acre (Natureserve 2001). Populations respond favorably to conditions created 3 to 10 years following forest regeneration in larger forest patches (Lancia 2000). Providing a sustained flow of regenerating forests is necessary to support populations of prairie warbler. Populations of prairie warbler have been steadily declining in the eastern United States (Trend -2.08, P value 0.0000; Sauer 2000). Population trends for this species are tracked by annual breeding bird surveys (BBS) and bird point counts conducted on the Sumter National Forest.

The American Black Bear *(Ursus Americanus)* is selected as a management indicator species to represent a mix of successional forests. Combinations of forests old enough to produce hard mast, forests with den trees, forests with a proliferation of soft mast, with high stem densities are important to fullfull life requirements of the black bear year round. Populations of this species are tracked by monitoring indicies that suggest trends, i.e. scent station surveys, harvest totals. Black Bear is known only to occur on the Andrew Pickens Ranger District.

## Direct and Indirect Effects

To guide provision of forest successional habitats in the draft plan and to facilitate effects analysis, four different mixes of successional forest conditions were defined and assigned to prescriptions, which were then allocated to national forest lands. These four options describe objectives for percentages of early-successional forest to be provided by natural causes or management actions, percentages of mid- and late-successional forests combined (including old growth), and percentages of late-successional forest (including old growth). Objectives were set for these measures because these were deemed the most meaningful measures of habitat availability for dependent species. The options were designed to cover the full spectrum of successional mixes needed to cover the range of preferences documented for forest-associated species. In other words, if each of these options is allocated to some portion of the landscape, all forest-associated species should find some portion of the landscape with optimal successional forest mixes.

Option 1 is assigned to those areas for which there are no specific objectives for creating early-successional forests through management actions. These areas would be expected to provide primarily mid-and late-successional forest habitats in the short-term, with late-successional forest conditions eventually predominating.

Option 2 areas are also areas with no specific objectives for early-successional forests, but creation of such habitat through management action may provide up to 4% of forested acres in early-successional forest conditions, where compatible with the emphasis of the prescription. These areas have an objective of a minimum of 75 % of forested acres in mid- and late-successional forest and a minimum of 50% in late-successional forest. Therefore, these areas also are expected to become dominated by late-successional forests over time.

Option 3 areas are characterized by objectives to create an intermediate mix of forest successional stages, with 4 to10% of forested land in early-successional forest condition. Objectives for older forests in these areas are to maintain a minimum of 50% of forested acres in mid- to late-successional forest and a minimum of 20% in late-successional forest.

Option 4 areas are characterized by a mix of forest successional stages, with an emphasis on early-successional forests. Objectives are to maintain 10 to 17% of forested acreage in early-successional, 20% in mid-and late-successional forests, and 10% in late-successional forest. Expected percentages of successional forest conditions by option are summarized in Table 3-30.

*Table 3-30. Desired percentage of forested acreage in early-successional, mid- and late-successional, and late-successional forest by successoinal mix options allocated to national forest lands.*

| Successional Mix Option | Early Successional | Mid- and Late-Successional | Late-succesional |
|---|---|---|---|
| 1 | 0 | 100 | 100 |
| 2 | 0-4 | >75 | >50 |
| 3 | 4-10 | >50 | >20 |
| 4 | 10-17 | >20 | >10 |

Allocation of these prescription options to national forest lands varies across alternatives. Forestwide mixes of successional habitats by alternative may be compared by comparing the acreage allocated to each of these four successional stage options (Table 3-31). These allocation percentages may be combined with desired successional mix percentages (Table 3-30) to estimate total forestwide successional forest mixes (Table 3-31). These estimates represent unconstrained attainment of forest successional stage objectives, and provide an additional means of comparing alternatives.

*Table 3-31. Percent of total forest acres allocated to successional stage options 1, 2, 3, and 4, by forest plan revision alternative, and projected percentages of total forested acreage to be maintained in early successional forest, mid-and late-successional forest, and late-successional forest, if option objectives are met, Sumter National Forest.*

| Alternative | % of Forested Acreage Allocated to Forest Successional Mix Option | | | | Estimated % of Forested Acreage by Successional Stage | | |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | Early | Mid and Late | Late |
| A | 13 | 0 | 22 | 65 | 7.4- 13.3 | > 52 | > 39 |
| B | 20 | 3.6 | 64 | 12 | 3.8 - 8.6 | >72 | >50 |
| D | 9.3 | 0 | 1.4 | 89 | 8.9 - 15 | >42 | >33 |
| E | 26 | 4.0 | 31 | 39 | 5.2 – 9.9 | >67 | >53 |
| F | 6.9 | 0 | 8.7 | 84 | 8.7 - 15 | >28 | >17 |
| G | 37 | 21 | 28 | 14 | 2.5 – 6.0 | >84 | >69 |
| I | 15 | 0 | 45 | 40 | 5.8 - 11 | >60 | >42 |

SPECTRUM modeling provides a means for examining attainment of desired successional mixes at particular points in time within the constraints of other factors such as existing age-class distribution. Modeled mixes of successional stages at 10 and 50 years of plan implementation vary by alternative due to the differences in management intensity and emphasis (Tables 3-32, 3-33, and 3-34).

*Table 3-32. Expected percent of forested acreage in early-successional forest conditions on the Sumter National Forest, after 10 and 50 years of implementing forest plan alternatives. (derived from SPECTRUM models)*

| | Mountains | | Piedmont | |
|---|---|---|---|---|
| Alternative | Year 10 | Year 50 | Year 10 | Year 50 |
| Alternative A | 3.8 | 4.9 | 13.0 | 9.5 |
| Alternative B | 2.3 | 6.9 | 5.1 | 6.3 |
| Alternative D | 7.5 | 7.5 | 10.0 | 9.2 |
| Alternative E | 2.1 | 5.1 | 7.8 | 7.8 |
| Alternative F | 7.7 | 8.3 | 14.0 | 13.0 |
| Alternative G | 0 | 0.4 | 5.9 | 5.8 |
| Alternative I | 2.8 | 3.4 | 11.0 | 9.1 |

*Table 3-33. Expected percent of forested acreage in mid- and late--successional forest conditions on the Sumter National Forest, after 10 and 50 years of implementing forest plan alternatives. (Derived from SPECTRUM models)*

| | Mountains | | Piedmont | |
|---|---|---|---|---|
| Alternative | Year 10 | Year 50 | Year 10 | Year 50 |
| Alternative A | 79 | 74 | 66 | 61 |
| Alternative B | 90 | 50 | 74 | 76 |
| Alternative D | 76 | 58 | 69 | 64 |
| Alternative E | 80 | 78 | 71 | 76 |
| Alternative F | 74 | 48 | 65 | 55 |
| Alternative G | 81 | 94 | 73 | 80 |
| Alternative I | 69 | 63 | 68 | 65 |

*Table 3-34. Expected percent of forested acreage in late-successional forest on the Sumter National Forest, after 10 and 50 years of implementing forest plan alternatives. (derived from SPECTRUM models)*

| | Mountains | | Piedmont | |
|---|---|---|---|---|
| Alternative | Year 10 | Year 50 | Year 10 | Year 50 |
| Alternative A | 57 | 54 | 32 | 18 |
| Alternative B | 68 | 28 | 40 | 45 |
| Alternative D | 53 | 41 | 35 | 19 |
| Alternative E | 57 | 59 | 37 | 39 |
| Alternative F | 51 | 31 | 31 | 6.8 |
| Alternative G | 58 | 76 | 39 | 50 |
| Alternative I | 47 | 42 | 34 | 29 |

Range-wide densities for prairie warbler average less than one breeding pair/ha with a range of 0.7 pairs/ha in western Massachusetts and up to 2.5/ha in southeastern Massachusetts (NatureServe 2001). Mean breeding densities calculated from several studies and reported by Hamel (1992) is 0.4 breeding pairs/ha. Mean territory size was 1.6 ha in Indiana and 0.5 ha in Maryland (Natureserve 2001). In a multi-year study in South Carolina, breeding densities were recorded from 0.3 to 0.6 pairs/ha in a longleaf pine plantation (Droge 1993; Wagner 1994; Irby 1995; Irby 1996) with peak densities occurring in years six and seven.

Because of the tight association of breeding prairie warblers with early-successional forests, prairie warbler populations are expected to vary by alternative in direct relation to the abundance of this successional stage.

## Cumulative Effects

Across the landscape which contain the Sumter National Forest, the mix of successional forest stages will be affected by actions on private lands, insect and disease outbreaks, catastrophic wildfire, and storms that serve to create relatively large patches of canopy tree mortality. Although activities on private lands, outbreaks, and storms are difficult to predict, levels of these influences are not expected to vary across alternatives. These external factors would be considered in site-specific planning under all alternatives to moderate cumulative effects. Early-successional forests created by outbreaks or storms would be included in calculations of existing conditions, which would be used to determine whether management actions are needed to meet early-successional forest objectives. Presence of quality successional forest habitats on surrounding private lands, to the extent they can be known, would be considered during site-specific planning to determine where within the range of successional forest objectives is most desirable for national forest lands. However, in order to provide for the diversity of plant and animal communities on national forest land as required by the National Forest Management Act, effort would be made under all alternatives to achieve successional mixes on national forest lands that are within the objectives or desired conditions of each allocated prescription and its associated successional mix option. Although exact mixes would vary somewhat across alternative as described in the preceding section, when viewed cumulatively across the landscape, it is expected that the national forest lands would provide a higher proportion of late-successional forests compared to early-successional forests under all alternatives.

## Permanent Openings and Old Fields, Rights-of Way, Fire Breaks, and Closed Roads as Linear Strips

### Affected Environment

Habitats considered here include permanent openings and old fields, utility rights-of way, and linear strips. Other early successional habitats such as woodlands, grasslands, savannas, and early successional forests are discussed elsewhere in this document.

The Eastern wild turkey (*Meleagris gallopavo)* is selected as a management indicator species for this collection of early successional habitats. Turkey utilize these unique habitats in forested areas for nesting, brood rearing, and periodically though out the year for food. Turkey populations respond to a variety and distribution of these habitat conditions. Turkey can be found throughout the Sumter National Forest. However, populations are declining on the Andrew Pickens District and are somewhat stable in the Piedmont.

### *Permanent Openings and Old Fields*

Permanent grass/forb and seedling/sapling/shrub habitats are important elements of early successional habitat. Permanent openings typically are one of two types: 1) maintained for wildlife habitat on an annual or semi-annual basis with the use of cultivation, mowing, burning, or other vegetation management treatments, or 2) shrub dominated patchy thickets with a high component of fleshy fruit producers (plum, persimmon, crabapple, dogwood, etc.) interspersed with native grass and forb species. The first type may also be planted to native grasses and forbs (partridge pea, switch grass, bluestem, etc.) or may be planted to non-invasive agricultural species such as clover, annual rye, chufa, wheat, millet, or other small grains. The second type of opening is commonly referred to as old fields that are kept in a shrubland openland condition. These are maintained on a less frequent basis (5-10 year intervals, usually with burning and mowing or selective cutting). They are largely influenced by past cultural activities and often contain fruit trees (pear, apple), sumac, grape tangles, briar patches, and a preponderance of annual and perennial herbs, grasses, woody shrubs, and tree seedlings. Many of the existing openings on the Sumter National Forest are a combination of these two types.

Permanent openings are used by a variety of wildlife, both game and non-game species. Parker et. al. (1992) reported use of agricultural openings by 54 species of birds and 14 species of mammals in a study on the Chattahoochee National Forest. Bird species observed included wild turkey, several species of raptors and woodpeckers, and numerous songbirds including a number of neotropical migrants such as pine warbler, ovenbird, and black-throated green warbler. The greatest number of avian species and highest bird species diversity was found within the edge zone of the openings. Mammals observed included species such as white-tailed deer, striped skunk, woodchuck, bobcat, black bear, red bat, eastern cottontail, opossum, and several small mammals.

The benefits of permanent openings to white-tailed deer are well documented. Permanent openings, especially those containing grass-clover mixtures, are used most intensively in early spring, but also are an important source of nutritious forage in winter, especially when acorns are in short supply (Wentworth et.al. 1990; Kammermeyer et.al. 1993). Kammermeyer and Moser (1990) found a significant relationship between openings and deer harvest with only 0.13% of the land area in high quality openings. Forest openings also are a key habitat component for wild turkeys throughout the year (Thackston et.al. 1991; Brenneman et.al. 1991). Maintained openings provide nutritious green forage in the winter and early spring and seeds during late summer and fall. Because of the abundance of insects and herbaceous plants produced in these openings, they are especially important as brood-rearing habitat for young turkeys (Nenno and Lindzey 1979; Healy and Nenno 1983). Linear openings, especially those associated with young regenerating forests, provide optimal brood habitat conditions for ruffed grouse (Dimmick et.al. 1996).

There also are numerous wildlife benefits from openings maintained in native species. Native warm season grasses provide nesting, brood-rearing, and roosting habitat for northern bobwhite and other grassland species of wildlife (Dimmick et.al. 2001). Native species are well adapted to local environments and generally require less intensive maintenance following establishment.

Old fields provide food and cover for a variety of wildlife species. A number of disturbance-dependent birds, such as northern bobwhite, grasshopper sparrow, golden-winged warbler, and blue winged warbler are associated with old field habitat (Hunter et.al. 2001). Recently abandoned fields are important for rabbits and many small mammals (Livaitis 2001). Woodcock use old fields as courtship, feeding, and roosting sites (Straw et.al. 1994; Krementz and Jackson 1999). Although managed less intensively than other types of permanent openings, some degree of periodic management is necessary to maintain these habitats.

There currently are approximately 1,225 acres of permanent openings (including old fields) on the Sumter National Forest (Table 3-35). This represents 0.3 % of the total national forest acres on the Sumter. A number of the openings are old farm sites that were in cultivation when the lands were acquired by the Forest Service. Others were created by the expansion of log landings following timber harvest or by closing and seeding old roads to create linear openings. All 1,225 acres are on State Wildlife Management Areas (WMAs) and are cooperatively maintained by South Carolina DNR and the Sumter National Forest.

*Table 3-35. Current acreage and percent of total forest acres of permanent openings, rights-of-way, and improved pastures on the Sumter National Forest 2002.*

| | Mountains | Piedmont |
|---|---|---|
| Total acres permanent openings [1] | 245acres | 980 acres |
| % of total Forest acres | 0.3 | 0.4 |
| Total Acres of ROW | 92 | 3320 |
| % of total Forest acres | 0.1 | 1.2 |
| Acres of closed roads maintained as linear strips | 80 | 500 |
| % of total Forest acres | 0.1 | 0.2 |

1 Includes old fields that are managed for wildlife

### *Rights-of-Way, Fire Breaks and Closed Roads*

Utility rights-of-way (ROW), firebreaks, and closed roads typically are managed for purposes other than to provide wildlife habitat. However, they can provide wildlife benefits if managed appropriately. Rights-of-way can be established and maintained in plantings that enhance food and seasonal cover to many species of wildlife. Once established, ROW maintenance costs generally are reduced. The conversion of fescue or other non-native sod to native forbs and grasses improves habitat conditions for northern bobwhite and numerous grassland species (Dimmick et.al. 2001). Maintaining roadways by periodically (every 2 to 3 years) establishing ground cover consisting of a combination of legumes, grasses, and cereal grains controls woody plant invasion, keeps roads in good condition, and makes high value food sources available to wildlife over a large area with minimal disturbance. Fuel breaks are located and maintained to provide a position to control prescribed burns or combat wildfire. Establishment of ground cover that is either green when fire dangers are elevated in early spring and late fall or does not form dense sod or produce volatile fuels can serve wildlife needs as well as aid in maintaining firebreaks. Roadways and firebreaks maintained in this manner are often referred to as linear strips.

The current acreage in utility rights-of-way and closed roads is shown in Table 3-35. Rights-of-way were estimated to average 100 feet in width, and closed roads an average of twelve feet in width. The acreages in rights-of-way and closed roads are relatively stable on the forest from year-to-year. Firebreaks are established on an as-needed basis, are largely ephemeral in nature, and acreage in this condition is highly variable in any given year.

## Direct and Indirect Effects

### *Permanent Openings and Old Fields*

The management prescriptions vary in how they treat the creation and maintenance of permanent openings. Each prescription has been assigned to one of three options.

Option 1 - Existing old fields and wildlife openings are not maintained, but are allowed to succeed to forest. In some cases, existing openings may be obliterated through tree planting and elimination of non-native species. New permanent wildlife openings are not created.

Option 2 - Existing old fields and openings for wildlife may be present and maintained, but no creation of new permanent openings of this type occurs. Native species are emphasized when establishing food plants for wildlife. Some openings provide permanent shrub/sapling habitats as a result of longer maintenance cycles.

Option 3 - Existing old fields and openings for wildlife may be present and maintained. Expansion of existing openings and/or creation of new openings may occur. Non-invasive non-natives are sometimes used when establishing food plants for wildlife, but native species are used where feasible and cost effective. Some openings provide permanent shrub/sapling habitats as a result of longer maintenance cycles.

No specific objectives for the quantity of permanent openings are established in the revised forest plan. Through the prescription allocation process however, the forest is zoned into areas of varying intensity of opening maintenance and development. Alternatives vary widely in amounts, but all add some acreage dedicated to permanent wildlife openings. For analysis, a forestwide goal for permanent wildlife openings was calculated for each alternative that reflects the desired future conditions of the mix of prescriptions within each alternative (Table 3-38). The actual amount of area dedicated to openings for a specific portion of the forest will be determined through site-specific analysis.

In order to protect established vegetation, a forestwide standard has been included that prohibits recreational (e.g., horseback riding, mountain biking, OHV use, and camping) on all permanent wildlife openings, including linear strips.

Table 3-36 displays the acres of existing permanent openings in each management prescription by alternative for the Sumter National Forest. Table 3-37 displays existing permanent openings by wildlife opening option by alternative. All acres in permanent wildlife openings in the column under Option 1 would be retired. Tables 3-39 and 3-40 display the expected amount and distribution of permanent openings across the Sumter National Forest for each alternative.

*Table 3-36. Acres of Existing Permanent Openings in each Management Prescription by Alternative on the Sumter NF.*

| Mgt. Rx | Alternative A | Alternative B | Alternative C | Alternative D | Alternative F | Alternative G | Alternative I |
|---|---|---|---|---|---|---|---|
| 1A | | | | | | | |
| 1B | 12 | 2 | | 2 | | 2 | |
| 2A1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2A2 | | | | | | | |
| 2A3 | 35 | 35 | 35 | 35 | 35 | 35 | 35 |
| 2B1 | 3 | 3 | 3 | 3 | | | |
| 2B2 | 28 | 91 | 72 | 46 | | | 41 |
| 2B3 | | 2 | 2 | | | | 2 |
| 4D | 24 | 9 | 25 | 32 | 4 | 50 | 4 |
| 4F | 41 | 46 | 49 | 46 | 75 | 73 | 78 |
| 4G1 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 5A | | | | | | | |
| 5C | | | | | | | 60 |
| 6A | | | | | | 177 | |
| 6B | | 19 | | 73 | | 76 | |
| 6C | 0 | 71 | 0 | 51 | | | 0 |
| 6D | | 60 | | 36 | | 193 | |
| 6E | | | | | | 66 | |
| 7A | | | | | | | 3 |
| 7C | 2 | | | 2 | | | |
| 7D | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| 7E1 | | | | | 0 | | 35 |
| 7E2 | 181 | | | 235 | | | 277 |
| 8A1 | | | | 59 | 612 | | 138 |
| 8A2 | | | | | | | |
| 8B2 | | 51 | | 391 | | | 36 |
| 8C | | 4 | | | | | |
| 8D | | | | | | | |
| 9A3 | | 141 | | | | 93 | 60 |
| 9A4 | | | | | | 231 | |
| 9E | | 165 | | | | | |
| 9F | 1 | 1 | 1 | 1 | | 1 | 1 |
| 9G2 | | 440 | | | | 145 | 46 |
| 9H | | 74 | | | | | |
| 10B | 831 | | 1027 | | 482 | 72 | 398 |
| 11 | | | | | 6 | | |
| 12A | 56 | | | 202 | | | |
| 12B | | | | | | | |

*Table 3-37. Acres of Existing Permanent Openings in each Permanent Opening Option by Alternative on the Sumter NF.*

| Alternative | Piedmont | | |
|---|---|---|---|
| | Option 1<br>No Maintenance of Existing Openings | Option 2<br>Existing Openings Maintained/ No new openings | Option 3<br>Existing Openings Maintained/ New openings allowed |
| | | | |
| Alternative A | 36 | 175 | 1014 |
| Alternative B | 102 | 903 | 220 |
| Alternative D | 26 | 172 | 1027 |
| Alternative E | 158 | 380 | 687 |
| Alternative F | 4 | 128 | 1094 |
| Alternative G | 305 | 848 | 72 |
| Alternative I | 5 | 311 | 849 |

*Table 3-38. Anticipated percent forest in permanent wildlife openings and linear strips on the Sumter National Forest by Alternative*

| | Alt A | Alt B | Alt D | Alt E | Alt F | Alt G | Alt I |
|---|---|---|---|---|---|---|---|
| Percent in openings | 3% | 0.7% | 3% | 4.1% | 5% | 0.6% | 2.5% |

*Table 3-39. Anticipated acreage and percent forest in permanent openings and linear strips on the Andrew Pickens District of the Sumter National Forest*

| Activity | Alt A | Alt B | Alt D | Alt E | Alt F | Alt G | Alt I |
|---|---|---|---|---|---|---|---|
| Total acres 10 years | 460<br>(0.6%) | 300<br>(0.4%) | 660<br>(0.8%) | 820<br>(1.0%) | 1,020<br>(1.2%) | 280<br>(0.3%) | 1,040<br>(1.3%) |
| Total acres in 50 years | 2,140<br>(2.6%) | 520<br>(0.6%) | 2,200<br>(2.6%) | 2,960<br>(3.6%) | 3,600<br>(4.3%) | 400<br>(0.5%) | 1,760<br>(2.1%) |

*Table 3-40. Anticipated acreage and percent forest in permanent openings and linear strips on the Piedmont Districts of the Sumter National Forest*

| Activity | Alt A | Alt B | Alt D | Alt E | Alt F | Alt G | Alt I |
|---|---|---|---|---|---|---|---|
| Total acres in 10 years | 1,840<br>(0.7%) | 1,200<br>(0.4%) | 2,640<br>(1.0%) | 3,280<br>(1.2%) | 4,080<br>(1.5%) | 1,120<br>(0.4%) | 1,760<br>(0.6%) |
| Total acres in 50 years | 8,560<br>(3.1%) | 2,080<br>(0.8%) | 8,800<br>(3.2%) | 11,840<br>(4.3%) | 14,400<br>(5.2%) | 1,600<br>(0.6%) | 7,040<br>(2.6%) |

Alternatives A, D, F, and I would retain existing distribution and abundance of wildlife openings on the forest. Alternative E would slightly alter the existing distribution, and all alternatives except B and G would add substantial acreage dedicated to permanent wildlife openings and linear strips. Recreational opportunities for viewing wildlife and hunting would benefit accordingly.

### *Rights-of-Way, Firebreaks, and Closed Roads*

In general, existing utility rights-of-way will be treated similarly under all alternatives. Rights-of-way typically are managed by third parties who should be encouraged to manage these to the extent possible to enhance their value to early-successional species. In addition, forestwide standards have been established that prohibit broadcast herbicide application for maintenance and require site-specific environmental analysis prior to maintenance operations.

## Cumulative Effects

Permanent openings are an important habitat element for a variety of birds (resident and migratory), mammals, reptiles, and insects in a forested landscape. However, they are poorly distributed and currently comprise a small percent (0.3%) of the landscape of the Sumter National Forest.

Habitat conditions provided in permanent openings are very different from what is provided by pastures, orchards, other agricultural fields, and golf courses that are much more common on adjacent private land. Generally, the openland conditions on private land are not maintained to benefit nesting, brood-rearing, food, and cover for wildlife and are not comparable to permanent wildlife openings on a national forest. In addition, the Forest Service does not have control of management of openings on private land. Land uses in areas that currently provide some habitat on adjacent private lands may be developed in the future and therefore cannot be relied on to provide long-term wildlife benefits.

Maintenance of existing openings and development of a meaningful level and distribution of a network of openings and linear strips (Alternatives A, D, E, F, I) on a national forest will predictably provide long-term wildlife benefits. It therefore is important to maximize the benefits from this limited acreage dedicated to permanent wildlife openings on the forest by maintaining them in high quality habitat conditions. It is not expected that private landowners will restore or manage to maintain significant amounts of high quality wildlife openings, and they would remain limited in abundance on the landscape without national forest maintenance and establishment efforts. Other open-land habitats such as rights-of way may provide wildlife benefits similar to openings if managed with wildlife considerations in mind.

## Old Growth

### Affected Environment

Very little "true" old growth is thought to remain in the eastern United States (Smith and Hamel 1991) but inventories are lacking. Site-specific inventories conducted for old growth on the Sumter National Forest include those by Paul Carlson in the Chattooga Watershed (1995), by Chick Gaddy in the Lower Chauga Watershed (1998), and by Clemson University on FS acquired land in the Jocassee Gorges Area (2001). Other inventories for old growth have been conducted periodically by Forest Service personnel.

Issues related to the amount of future old growth which should be provided on the Forest, as identified during initial scoping conducted in 1996-1997, include old growth needed to provide for wildife habitat (specifically for black bear) and for botanical values, old growth for recreational values and to research old growth processes, to provide woody debris for streams and terrestrial ecosystems, old growth for aesthetic and spiritual values, for developing plants which may harbor medicinal values, and for natural heritage or public heirlooms to be passed on, from one generation to the next. Some commented that maintaining acreage in old growth will increase costs, reduce volumes and timber values, reduce biodiversity, and pose forest health risks. Others commented that the amount of old growth should increase, and that there should be an ample and well-distributed network of old growth restoration areas.

In June of 1997 the Southern Region of the Forest Service completed a report entitled Guidance for Conserving and Restoring Old-Growth Forest Communities on National Forests in the Southern Region, hereafter called the "old growth report" (Forest Service 1997). The old growth report contains direction for providing conditions for old growth to develop, in conjunction with Forest plan revision (old growth report, p.8-22), including direction for conducting a preliminary inventory for old growth, to be used as a tool in Forest planning, definitions for several old growth community types, and direction for providing for a network of small, medium, and large-sized patches of old growth on the National Forests based on social, biological, ecological, and spiritual issues and concerns.. The Southern Appalachian forests undergoing forest plan revision are committed to implementing the old growth report across all alternatives.

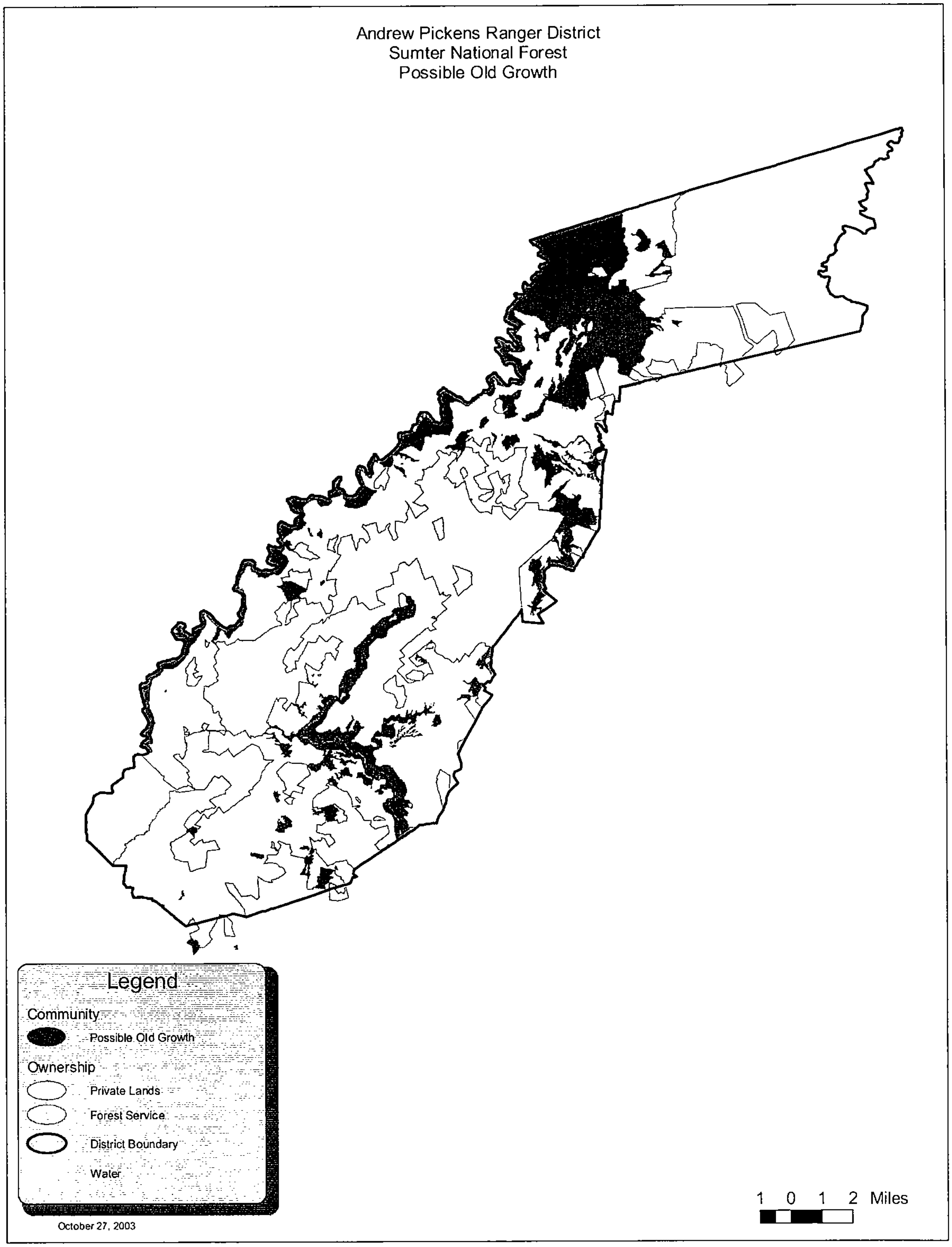
The Southern Appalachian Assessment (SAA) pre-dates the development of the regional old growth report. The SAA combined the late-successional and potential old growth vegetation stages and found that they represented slightly more than 18% of the assessment area considering all ownerships (SAMAB 1996, Report 5:24). Within this 18%, rounded percents were; national forest 42%, private non-industrial forest 36%, other public 20%, and private industrial 1% (SAMAB 1996, Report 5:26). Across the assessment area, the three most commonly represented forest cover type groups were, in order: oak-hickory, oak-pine, and southern yellow pine. The late-successional and old growth combined group was 45% of national forest and an estimated 54% of other public (SAMAB 1996, Report 5:168). On national forest there had been a trend of increase in the late-successional and old growth stage acreage during the period from the mid-1970s to 1995 in each forest type group (SAMAB 1996, Report 5:173). In addition, within the assessment area, unsuitable acreage (not planned for timber harvest) exceeded suitable (planned for timber harvest) acreage on national forest for each old growth type group except: (a) river floodplain hardwood forest and (b) eastern riverfront forest. Total national forest acreage was 1,098,491 with 61% of that being unsuitable (SAMAB 1996, Report 5:178).

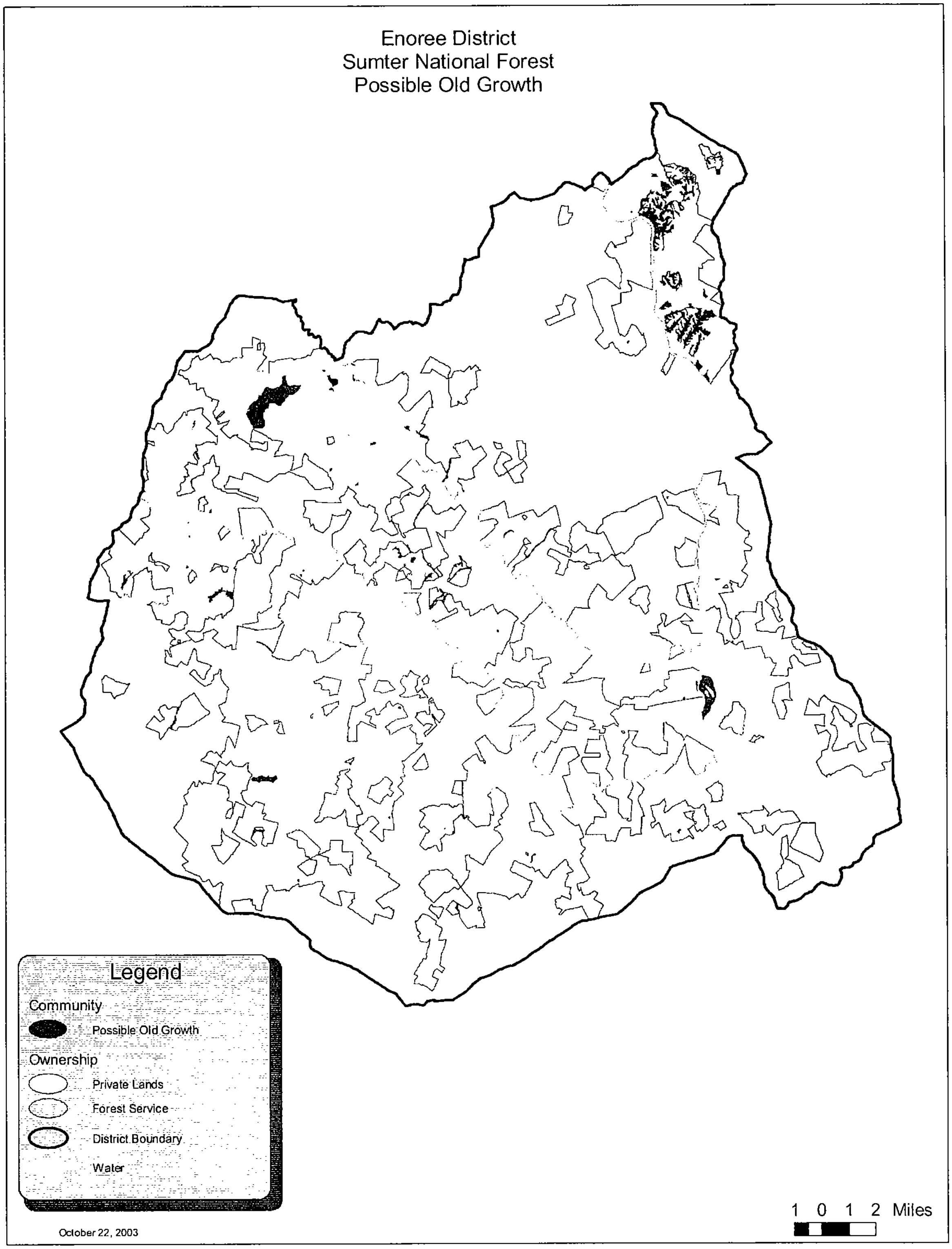
Consistent with direction in the old growth report, the Sumter National Forest developed a "Preliminary Inventory of Possible Old Growth Forests," hereafter called "possible old growth inventory." The possible old growth inventory was developed initially in 1997, and the same old growth attributes were reran using GIS in 2002. The possible old growth inventory was based on existing data as described in the old growth report (pp.8-11). Sources of data on the Sumter National Forest included Jones (1988); Carlson (1995); selected stands from Gaddy (1998); timber stand inventory data (2002); and unsuitable land as identified in the 1985 Sumter forest plan. Changes in possible old growth acres, occurring between 1997 and 2002, were a result of changes in interpretation of unsuitable lands as defined in the 1985 Forest Plan. Select unsuitable acreages found in the Calhoun Experimental Forest, and select areas included from proposed botanical areas, were eliminated from the 2002 coverage based on site-specific inventories. In 2003, a query of the 2002 updated possible old growth inventory resulted in acreages in five possible old growth community types as follows (Table 3-41):

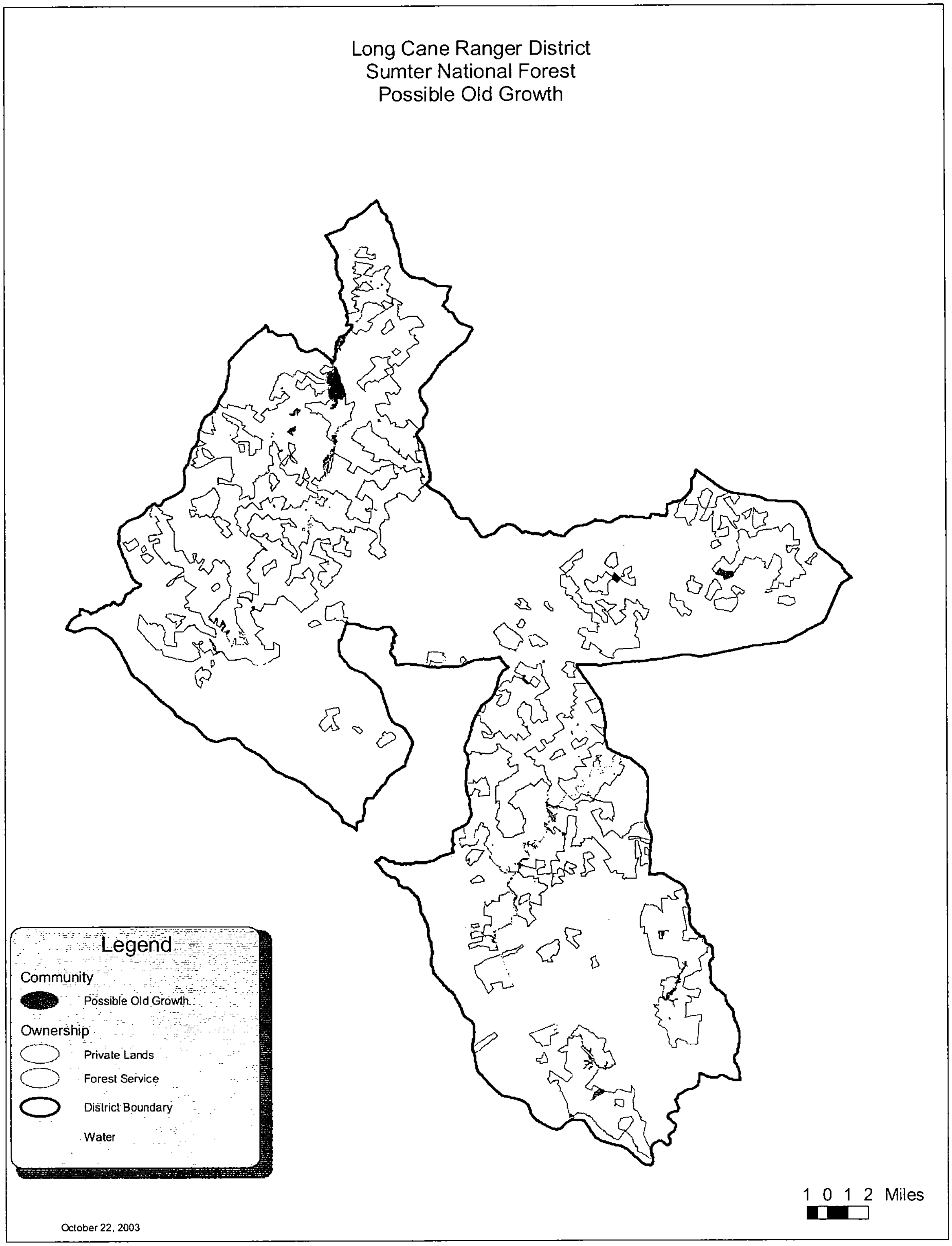
*Table 3-41. Acres on the Possible Old Growth Inventory by Community Type and Ecological Section for the Sumter National Forest, 2002*

| **Community #** | **Community** | **Blue Ridge** (acres) | **Piedmont** (acres) |
|---|---|---|---|
| 2/5 | Conifer/Northern Hardwood & Mixed Mesophytic Forests | 7702 | 85 |
| 13/28 | River Floodplain & Eastern Riverfront Forests | 156 | 2103 |
| 21 | Dry-mesic oak forests | 5706 | 3298 |
| 22/24 | Dry-xeric oak forest, woodland, savanna | 2583 | 7 |
| 25 | Dry-mesic oak-pine & pine-oak | 7563 | 864 |
| **TOTAL** | | **23,710** | **6,357** |

***Source:*** *Plan revision CISC data, base year 2003 * loblolly pine was eliminated from this analysis*


Andrew Pickens Ranger District
Sumter National Forest
Possible Old Growth
Legend
Community
Possible Old Growth
Ownership
Private Lands
Forest Service
District Boundary
Water
1 0 1 2 Miles
October 27, 2003


Enoree District
Sumter National Forest
Possible Old Growth
Legend
Community
Possible Old Growth
Ownership
Private Lands
Forest Service
District Boundary
Water
1 0 1 2 Miles
October 22, 2003

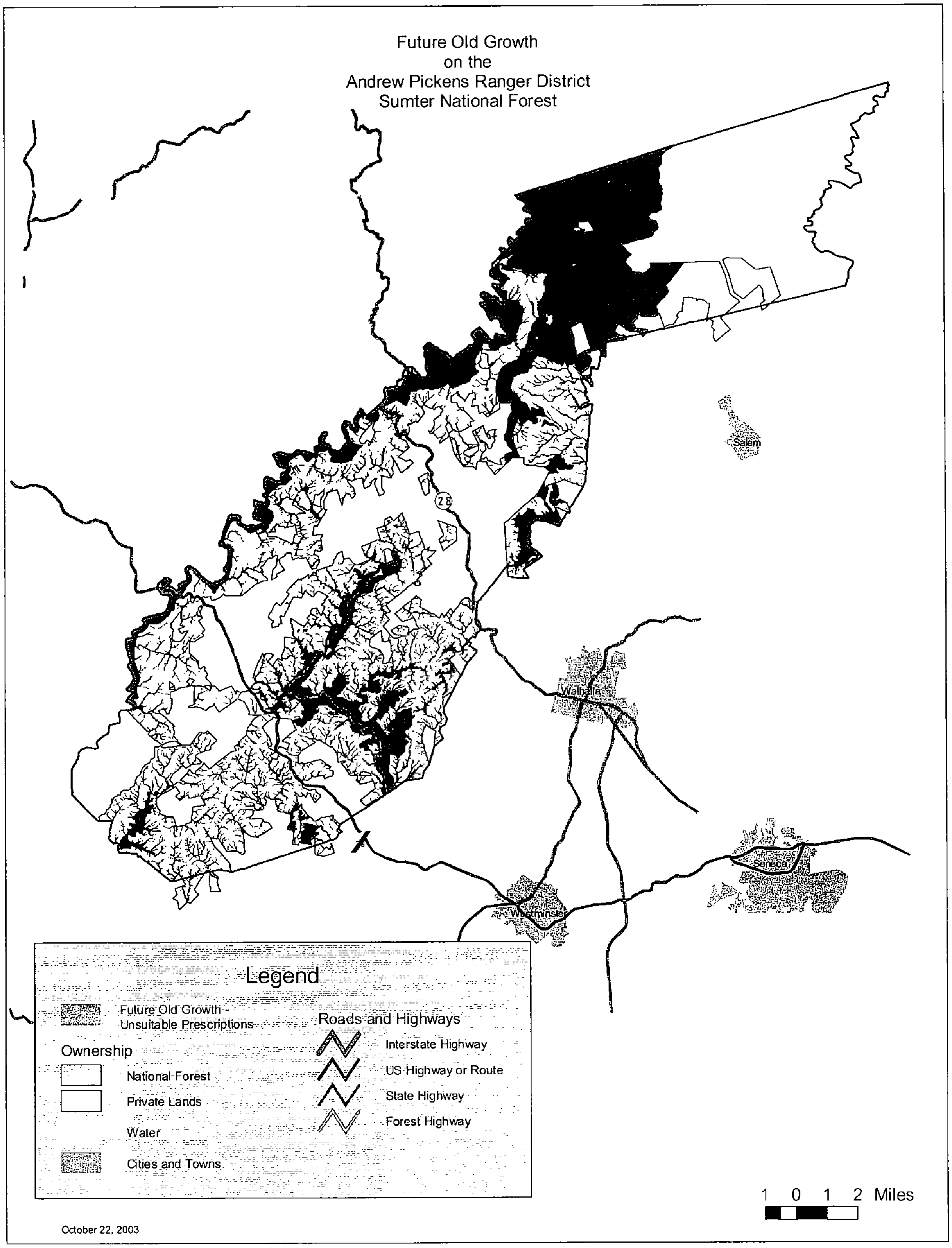

Long Cane Ranger District
Sumter National Forest
Possible Old Growth
Legend
Community
Possible Old Growth
Ownership
Private Lands
Forest Service
District Boundary
Water
1 0 1 2 Miles
October 22, 2003

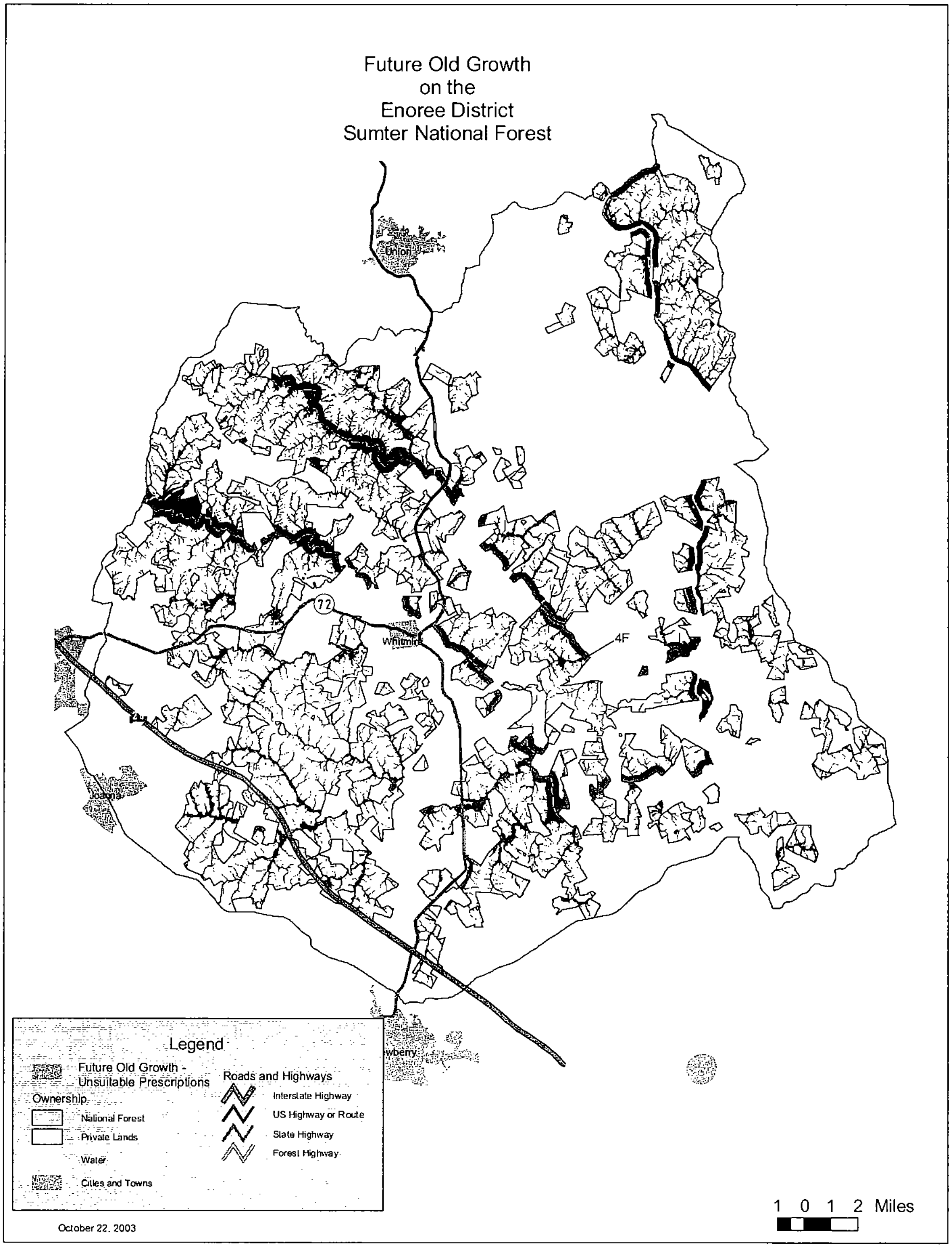
The forests will provide for an adequate representation of old growth community types (old growth report, p.18). To address the ecological capabilities on the Sumter National Forest in providing for a variety of old growth community types, the following displays the acreage in communities (crosswalked to a forest type, site index combination), independent of age (Table 3-42). Loblolly pine stands, which are anthropogenic in origin, are listed separately. The crosswalk for determining dry-xeric communities (type 22/24), differed from that used for the possible old growth inventory (above).

*Table 3-42. Total Forested Acres by Old Growth Community Type and Ecological Section for the Sumter National Forest*

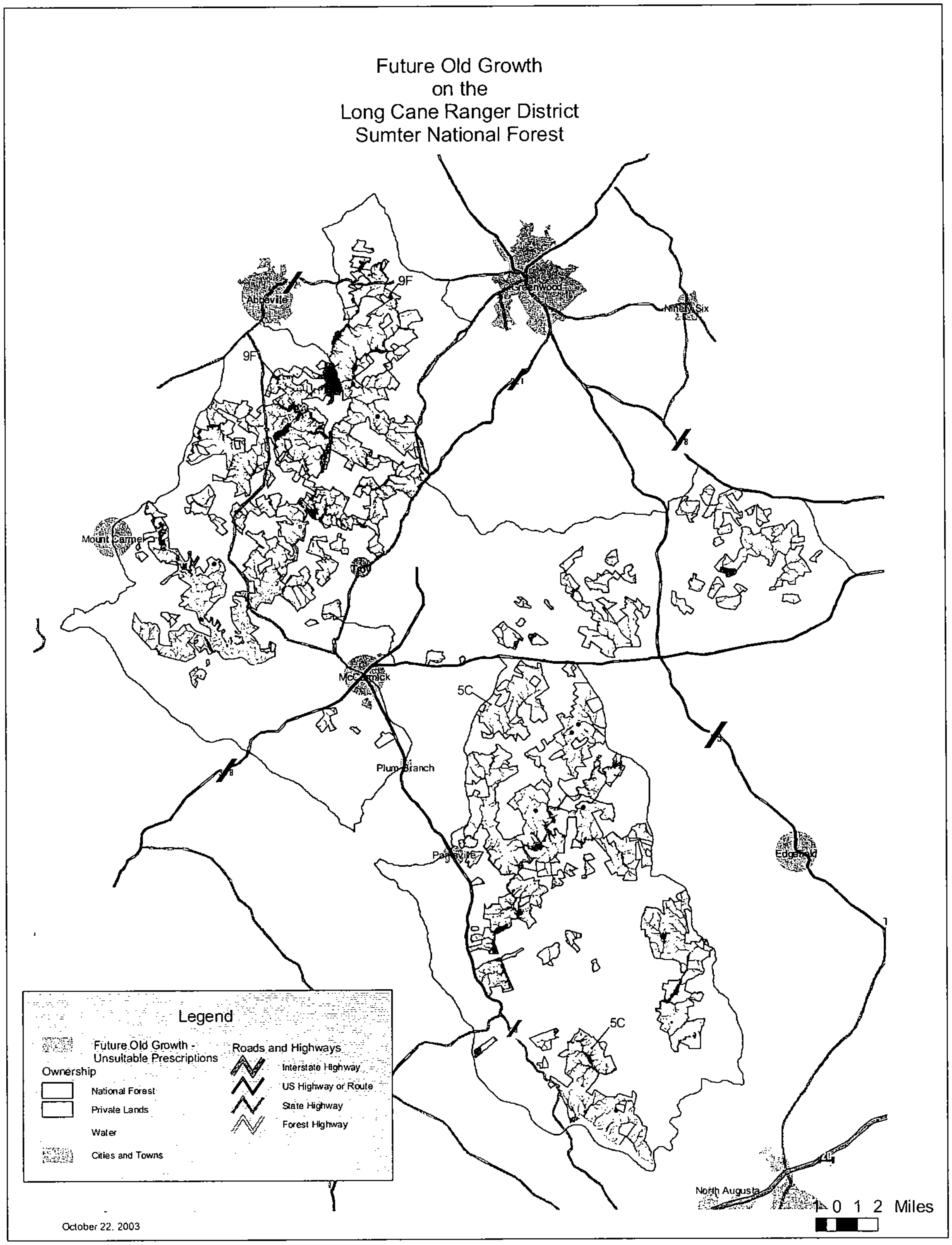
| Community Type Number | Community Type | Blue Ridge (acres) | Piedmont (acres) |
|---|---|---|---|
| 2/5 | Conifer/northern hardwood & mixed mesophytic | 19,770 | 1,820 |
| 13/28 | River floodplain & eastern riverfront forests | - | 28,350 |
| 21 | Dry-mesic oak forest | 15,070 | 29,810 |
| 22/24 | Dry-xeric forest, woodland, savanna | 1,723 | 1,700 |
| 25 | Dry-mesic oak-pine & pine-oak | 34,890 | 2,240 |
| NA | Loblolly pine | 6,850 | 181,450* |
| **TOTAL** | | **78,280** | **245,394** |

***Source:*** *Plan revision CISC data, base year 2002 *99.8% loblolly pine, the rest other pines*


Future Old Growth
on the
Andrew Pickens Ranger District
Sumter National Forest
28
Salem
Walhalla
Seneca
Westminster
Legend
Future Old Growth -
Unsuitable Prescriptions
Ownership
National Forest
Private Lands
Water
Cities and Towns
Roads and Highways
Interstate Highway
US Highway or Route
State Highway
Forest Highway
1 0 1 2 Miles
October 22, 2003



Future Old Growth
on the
Enoree District
Sumter National Forest
Union
72
Whitmire
4F
Joanna
wberry
Legend
Future Old Growth - Unsuitable Prescriptions
Ownership
National Forest
Private Lands
Water
Cities and Towns
Roads and Highways
Interstate Highway
US Highway or Route
State Highway
Forest Highway
1 0 1 2 Miles
October 22, 2003


Future Old Growth
on the
Long Cane Ranger District
Sumter National Forest
Abbeville
Greenwood
Ninety Six
9F
9F
Mount Carmel
Troy
McCormick
5C
Plum Branch
Parksville
Edgefield
5C
North Augusta
0 1 2 Miles
Legend
Future Old Growth - Unsuitable Prescriptions
Ownership
National Forest
Private Lands
Water
Cities and Towns
Roads and Highways
Interstate Highway
US Highway or Route
State Highway
Forest Highway
October 22, 2003

## Direct and Indirect Effects

Consistent with goal 11 in the proposed forest plan, the forest will provide for a network of small, medium, and large-sized patches of old growth (old growth report, p.16). Allocations for medium and large-sized old growth patches are provided through the allocation of "old growth compatible management prescriptions" (Table 3-43). Maps of these prescriptions are included in the process record. For the purposes of this analysis, we included those management prescriptions that are classified as "unsuitable" for timber production. Unsuitable land is not scheduled for regular timber harvest, and although vegetation management can occur, it is done for reasons other than to supply timber to local economies. It is assumed that in these areas, management could occur in association with trail maintenance, hazard tree removal, or wildlife, fish, or plant community restoration work on up to 10% of the area. Prescribed burning and the cutting of living vegetation may occur when consistent with the desired condition and associated prescription or management-level objectives or standards.

The following management prescriptions applied on the Sumter National Forest were included in the analysis as old growth compatible management prescriptions:

*Table 3-43 Old Growth and Old Growth Compatible Management Prescriptions Across All Alternatives for the Sumter National Forest.*

| Mgmt Rx No. | Management Prescription Name |
|---|---|
| 1.A. | Congressionally-designated Wilderness Area |
| 1.B. | Recommended to Congress for Wilderness Study |
| 2.A.1 | Congressionally-designated Wild Segment of Wild & Scenic River System |
| 2.A.2 | Congressionally-designated Scenic Segment of Wild & Scenic River System |
| 2.A.3 | Congressionally-designated Recreational Segment of Wild & Scenic River System |
| 2.B.1 | Recommended to Congress for Designation as a Wild Segment of the Wild & Scenic River System |
| 2.B.2 | Recommended to Congress for Designation as a Wild Segment of the Wild & Scenic River System |
| 2.B.3 | Recommended to Congress for Designation as a Recreational Segment of the Wild & Scenic River System |
| 4.D. | Botanical-Zoological Areas |
| 4.F. | Scenic Areas |
| 6.A. | Old Growth with Natural Process Emphasis |
| 6.B. | Areas Managed to Restore/Maintain Old Growth Characteristics |
| 6.C | Old Growth Areas Managed With a Mix of Natural Processes & Restoration |
| 6.D | Core Areas of Old Growth Surrounded by Areas with Extended Even-Aged Management |
| 6.E | Core Areas of Old Growth Surrounded by Areas under Uneven-aged Management |
| 7.E.1 | Dispersed Recreation – Unsuitable Land |

| | |
|---|---|
| 9.F. | Rare Communities |
| 11 | Riparian Corridors |
| 12.A. | Remote Backcountry Recreation – Few Roads |
| 12.B | Remote Backcountry Recreation – Non-Motorized |

Based on the relative abundance of old growth compatible prescriptions, it is anticipated that future old growth on the Sumter National Forest will be provided in the following proportions within medium and large-sized patches based on the following two tables (Tables 3-44 and 3-45).

*Table 3-44. Acres Allocated to Old Growth Compatible Prescriptions by Alternative and by Community Type on the Sumter NF, Andrew Pickens Ranger District*

| Type# | Alt. A | Alt. B | Alt. D | Alt. E | Alt. F | Alt. G | Alt. I |
|---|---|---|---|---|---|---|---|
| 2/5 | 13,560 | 12,600 | 8660 | 11,160 | 4620 | 17,220 | 12,813 |
| 13/28 | - | - | - | - | - | - | - |
| 21 | 9100 | 8500 | 11,160 | 8,950 | 2,770 | 14,770 | 9,029 |
| 22/24 | 860 | 750 | 320 | 910 | 32 | 3,180 | 657 |
| 25 | 34,890 | 15,630 | 11,790 | 6470 | 6470 | 34,810 | 13,986 |
| Loblolly Pine | 6850 | 1910 | 860 | 240 | 240 | 6,850 | 743 |
| Total Acres Allocated | 33,120 | 31,280 | 19,105 | 35,170 | 14,120 | 66,690 | 37,228 |

*Table 3-45. Acres Allocated to Old Growth Compatible Prescriptions by Alternative and by Community Type on the Sumter NF, Piedmont Districts*

| Type# | Alt. A | Alt. B | Alt. D | Alt. E | Alt. F | Alt. G | Alt. I |
|---|---|---|---|---|---|---|---|
| 2/5 | 890 | 860 | 890 | 950 | 60 | 990 | 842 |
| 13/28 | 20,160 | 21,800 | 20,310 | 21,180 | 890 | 21,410 | 20,735 |
| 21 | 11,170 | 14,840 | 11,650 | 13,480 | 1120 | 12,760 | 11,553 |
| 22/24 | 580 | 650 | 580 | 600 | - | 600 | 533 |
| 25 | 640 | 1560 | 640 | 920 | 3 | 1690 | 863 |
| Pine | 21,370 | 45,270 | 23,970 | 48,790 | 1300 | 43,920 | 24,012 |
| Total Acres Allocated | 54,820 | 84,980 | 58,050 | 85,930 | 3,400 | 81,360 | 58,538 |

The tables above suggest that old growth is adequately represented across old growth community types, in proportion to their relative abundance at this time, particularly on the Andrew Pickens. However, several community types, including xeric oak and shortleaf pine woodlands and dry-mesic oak forests or woodlands, are much more rare today than they were prior to Forest Service acquisition. Forestwide objectives to restore woodlands and shortleaf pine communities and to promote oak regeneration on the piedmont, address the restoration of community types which are relatively uncommon through management prescriptions which allow more active management.

The possible old growth inventory was not ground-truthed, but was considered in the allocation of management prescriptions conducive to maintaining or restoring old growth conditions. Based on a forestwide standard common to all alternatives, existing old growth, when encountered, will be managed to protect the old growth characteristics. Site-specific inventories will be conducted prior to the implementation of projects that have the potential to affect them. This standard applies equally to all alternatives and with this standard in place, there is no anticipated direct loss through the management of small patches of existing old growth stands in any alternative.

Indirect effects to small patches of old growth, including those associated with the invasion of non-native species, could occur as a result of management activities occurring adjacent to these patches. Other indirect effects could result from the invasion of forest pests such as southern pine beetle, hemlock woolly adelgid, or oak decline. These will be addressed at the project level as needed to ensure that the old growth values are protected.

## Cumulative Effects

The cumulative effects associated with the allocation of old growth include economic effects, including effects to local economies which rely on the supply of timber from the national forests, social effects, and biological effects. The supply of old growth conditions on private lands is likely to decline in the future as population centers continue to expand, suggesting that the national forests will provide a large role in creating and maintaining these areas in future, especially for recreationists. Large trees create a special place for people who come to the national forest to view nature and escape urbanization. The demand placed on older forests for timber will continue to grow as well, as human populations grow and the demand for wood products continues to increase. Few or no "old growth" obligate species are known from the Sumter National Forest though many prefer older forests. Alternative I provides for 26% of the forested acres in management prescriptions conducive to creating or maintaining old growth conditions, and all alternatives, with the exception of current management (Alternative F), contain standards which will protect existing old growth when it is encountered on the forest as a result of site-specific inventories. Therefore, it is determined that implementation of all alternatives (with the exception of alternative F) will meet the intent of the old growth report in providing for a network of small, medium, and large-sized patches of old growth. Alternative I, by containing forestwide objectives to restore woodlands, shortleaf pine, and oak-dominated hardwood communities, will go further to encourage the development of communities that are less common than they were prior to Forest Service acquisition.

# Terrestrial Habitat Elements

## Riparian

### Affected Environment

This section focuses on terrestrial habitat aspects of riparian areas; aquatic aspects of these ecologically important areas are covered under assessment of watersheds and aquatic systems.

Terrestrial riparian habitats encompass the transition area between aquatic systems and upland terrestrial systems. All wetlands (including beaver ponds), as well as margins of varying widths along streams, rivers, lakes, ponds, and reservoirs, are contained within terrestrial riparian habitats. These areas provide a number of critical functions for associated species. Most importantly, they provide rich, moist environments not often found in upland areas. Riparian terrestrial habitats may serve as corridors for wildlife movement, allowing for daily travel and seasonal migration. The riparian area may serve as a connector of habitats and populations allowing gene flow to occur, thus keeping populations genetically vigorous (Harris 1988).

Riparian habitats ideally include a mosaic of native plant and animal communities and successional stages, with a predominance of late-successional forests. Late-successional riparian forests contain multiple canopy layers that provide a variety of ecological niches, thermal and protective cover, and maintenance of moist conditions. Decadence of older forests provides an abundance of snags and downed wood, which also helps retain moisture and provides important habitat substrate for reptiles, amphibians, small mammals, invertebrates, and mosses and liverworts. The majority of riparian dependent species need or prefer late-successional forest conditions for the diverse structure and the moist, temperature-moderated microclimates they provide. However, some species require early-successional or shrubby riparian habitats.

Disturbance regimes in riparian areas differ from those of adjacent uplands in important ways. Sheltered topographic positions and moist conditions generally reduce disturbance caused by wind and fire. Disturbance sources more common in riparian areas are beaver activity and flooding and channel scour, especially along stream banks. These operate in addition to more universal factors such as insect and disease outbreaks. One of the most important disturbance factors in riparian areas for at least the past thousand years is anthropogenic clearing, which, even prior to European settlement, was sufficient to create large areas of early-successional riparian habitats such as canebrakes (Brantley and Platt 2001). Concentration of anthropogenic disturbances in riparian habitats was the result of the high fertility and level terrain of these areas. Such effects were likely most predominant along larger streams and rivers. Today, these same factors continue to drive anthropogenic disturbance in these areas. The value of these areas for human uses has resulted in many riparian zones along major watercourses remaining in private ownership while upper reaches were converted to public ownership. Prior to European settlement, anthropogenic disturbance along smaller streams, which are more typical of national forest lands, was likely less extensive, resulting in a greater predominance of late-successional conditions in these riparian areas. The challenge for federal land managers today is to try to restore, to the extent possible, the network of mature forest riparian corridors critical to many species and to water quality, while providing some level of quality habitats for those species adapted to early-sucessional riparian habitats.

The Southern Appalachian Assessment (SAA SAMAB 1996) included analysis of cover classes within 100 feet of watercourses for the entire study area. Satellite data with 30-meter resolution were used, resulting in only larger watercourses being detected. The 100-foot corridor width was selected due to the precision of the database and because riparian corridors of 100-160 feet can be useful for correlation of the riparian landscape to stream habitat and biological integrity (SAMAB 1996: 72). Based on this analysis, within the SAA study area there are approximately 2.3 million acres in the riparian zone. Land cover classes for the riparian study area were: 70% forested, 22% pasture/herbaceous, 3% cropland, 4.3% developed/barren, and 0.7% wetland. Ownership of land in the riparian zone in the SAA area is mainly private, approximately 85%, with national forests being the next major owner at approximately 10%. The remaining 5% is in national parks, the Cherokee Indians' ownership, other federal holdings, and state parks and forests (SAMAB 1996:71-74).

Riparian forest cover varied across the study area from more than 90% to less than 25%, with the Ridge and Valley ecoregion tending to have less forest cover in the riparian zone than the Blue Ridge and other ecoregions. The analysis also found that "[l]ands in federal ownership, such as national forests and national parks, have significantly more forest cover in the riparian zone than do lands in other ownerships."

On the Sumter National Forest there are approximately 67,000 acres associated with the riparian corridor (Tables 3-46 and 3-47). This represents nearly 20% of the national forest. Riparian areas, which are recognized by a combination of soil, vegetation, and hydrologic characteristics, are a part of the riparian corridor.

*Table 3-46. Current acreage (m acres) in the riparian corridor by community type and successional stage in the mountains on the Sumter National Forest, 2002.*

| Community Type | Successional Stage | | | | |
|---|---|---|---|---|---|
| | Early | Sapling/ Pole | Mid | Late | Total |
| Conifer-Northern Hardwood Forest, Mixed Mesophytic Forest, River Floodplain Hardwood Forest, Eastern Riverfront Forest | <0.1 | 0.5 | 0.5 | 1.3 | 2.3 |
| Dry-Mesic Oak Forest | <0.1 | 0.3 | 0.7 | 1.8 | 2.9 |
| Pine Types | <0.1 | 0.2 | 0.9 | 2.6 | 3.8 |
| TOTAL | 0.2 | 1.1 | 2.1 | 5.6 | 9.0 |

*Table 3-47. Current acreage (m acres) in the riparian corridor by community type and successional stage in the piedmont on the Sumter National Forest, 2002.*

| Community Type | Successional Stage | | | | |
|---|---|---|---|---|---|
| | Early | Sapling/ Pole | Mid | Late | Total |
| Conifer-Northern Hardwood Forest, Mixed Mesophytic Forest, River Floodplain Hardwood Forest, Eastern Riverfront Forest | <0.1 | 0.5 | 2.1 | 17.8 | 20.4 |
| Dry-Mesic Oak Forest | 1.3 | 3.8 | 6.0 | 9.0 | 20.1 |
| Pine and Pine-Oak Types | <0.1 | 6.5 | 6.5 | 3.9 | 17 |
| TOTAL | 1.4 | 10.8 | 14.6 | 30.7 | 57.5 |

Many terrestrial species of viability concern are associated with riparian habitats (Appendix F). Most are associated with late-successional riparian forests, but some require the dense understories that result from open canopy or early-successional conditions.

The primary indicator used to assess terrestrial habitat conditions within riparian areas is forestwide acreage of riparian corridors by successional stage. The Acadian flycatcher (*Empidonax virescens*) is selected as an appropriate management indicator species for mid- and late-successional riparian forest habitat. It requires deciduous forest near streams for breeding and is not often found outside of these habitats during the breeding season (Hamel 1992:193). Its presence indicates riparian forests with relatively high levels of canopy cover and low levels of management disturbance – conditions required or preferred by many riparian associated species. Two species, the American woodcock *(Scolopax minor)* and the Swanison's warbler *(Limnothlypis swainsonnii)* are selected as indicator species for early successional riparian forests. Swanison's warbler require high stem densities with little to no ground cover which represent conditions preferred by another suite of riparian associated species. Swainson's warbler (a summer resident) currently are incidental in the Piedmont and found in low numbers on the Andrew Pickens District. American woodcock requires shrubby cover, relatively open overstory conditions, high stem densities and fertile soils with an abundance of earthworms. American woodcock (a winter resident and occasional summer breeder) populations fluctuate widely and are known to occur in low numbers throughout the Sumter National Forest. Population trends for these species are tracked by annual breeding bird surveys (BBS) and bird point counts conducted on the Sumter National Forest. In addition American woodcock can be counted during breeding and migration periods.

## Direct and Indirect Effects

Under all alternatives, riparian corridors are managed under the riparian prescription. The prescription defines these corridors by setting minimum widths of 100 feet on either side of perennial streams and 50 feet on either side of intermittent streams, but also indicates that these corridors "should be expanded to include all of the true riparian area." The management goal for riparian corridors is to maintain or enhance the structural and functional integrity of riparian areas and associated aquatic and upland systems. Riparian corridor characteristics important to structural and functional integrity for terrestrial wildlife include habitat connectivity; vegetation diversity (including age, species composition, and vegetation layer diversity), vegetation vigor, abundance of snags and woody debris, and a width that is adequate to retain riparian habitat functions (Knutson and Naef 1997). Riparian corridors include the concept of buffering streams to retain important stream functions, but they also encompass the functional aspects of riparian areas relative to uplands. Therefore, they present the opportunity to manage riparian habitat as a more completely functioning system in which streams and uplands mutually influence each other (Knutson and Naef 1997; Tiner 1999).

To provide for riparian integrity, management standards are included in the riparian prescription. These include provisions to provide desirable levels of woody debris and controls on impacts from grazing, recreational uses, mineral development, and fire line construction. Vegetation management is limited to that needed to maintain or improve riparian function or to provide a continual supply of habitat for riparian associated species. Zones around channeled ephemeral streams are also recognized as part of the riparian prescription area, with standards designed to ensure protection of channels and their function as part of the riparian network.

Forestwide objectives for canebrake restoration, creation of early-successional riparian forests, and creation of canopy gaps to increase structural diversity in closed canopy riparian forests are included in the draft revised plan to provide for community diversity